# User Manual

## TesiMod Operating Terminal BT35

| | |
|---|---|
| Part Number: | 80 860.663 |
| Version: | 1 |
| Date: | 17.08.2005 |
| Valid for: | BT35EM, BT35ET |

SÜTRON ELECTRONIC GMBH

| Version | Date | Modifications |
|---|---|---|
| 1 | 17.08.2005 | First Edition |

# Overall Table of Contents

# 1 Important Notes

## 1.1 Symbols

The symbols in this manual are used to draw your attention on notes and dangers.

### 1.1.1 General Symbols

**Danger**
This symbol is used to refer to instructions which, if ignored or not carefully followed could result in personal injury.

**Note**
This symbol indicates application tips or supplementary notes.

**Reference to source of information**
This symbol refers to detailed sources of information on the current topic.

### 1.1.2 Specific Symbols

The following symbols indicate specific dangers which could result in damage to equipment or personal injury or even up to the death of the operator.

**Danger - Electric Shock**

**Danger - Corrosive**

**Danger - Toxic**

**Danger - Explosive**

**Danger - Fire**


**Danger - Infrared Light**

**Danger - Electrostatic Charge**

## 1.2 Safety Notes

- Read this manual carefully before using the operating device. Keep this manual in a place where it is always accessible to all users.
- Proper transportation, handling and storage, placement and installation of this product are prerequisites for its subsequent flawless and safe operation.
- This user manual contains the most important information for the safe operation of the device.
- The user manual, in particular the safety notes, must be observed by all personnel working with the device.
- Observe the accident prevention rules and regulations that apply to the operating site.
- Installation and operation must only be carried out by qualified and trained personnel.

## 1.3 Intended Use

- The device is designed for use in the industry.
- The device is state-of-the art and has been built to the latest standard safety requirements. However, dangerous situations or damage to the machine itself or other property can arise from the use of this device.
- The device fulfills the requirements of the EMC directives and harmonized European standards. Any modifications to the system can influence the EMC behavior.

This is a class A device. This device may cause radio interference in residential areas. In this case, the user may be required to introduce appropriate countermeasures, and to bear the cost of same.

## 1.4 Target Group

All configuration, programming, installation, commissioning, operating and maintenance work in connection with the automation system must be performed by trained personnel only (e.g. qualified electricians, electrical engineers, etc.).

The configuration and programming personnel must be familiar with the safety concepts of automation technology.

The operating personnel must have been trained in handling the controller and be familiar with the operating instructions.

The installation, commissioning and maintenance personnel must have an education which entitles them to work on automation systems.

# 2 Installation and Commissioning

## 2.1 Unpacking the Device

Unpack all parts carefully and check the contents for any visible damage in transit. Also check whether the shipment matches the specifications on your delivery note.

If you notice damages in transit or discrepancies, please contact our sales department immediately.

## 2.2 Mounting the Device

When installing the device, leave a gap of at least 30 mm (1.181") around the device to ensure sufficient air circulation.

When the operating device is installed horizontally, please note that additional sources of heat beneath the operating device may result in heat accumulation.
Make sure to allow sufficient heat dissipation!
Comply with the allowable temperature range listed in the technical data for the use of the operating device!

To ensure the specified degree of protection, make sure that the seal rests flat on the mounting surface and the fastening screws are uniformly tightened.

The device can be easily and quickly mounted from the front.

1. Insert the device in the mounting cutout from the front.
2. Secure the device with fastening screws.

### 2.2.1 Front Panel Dimensions

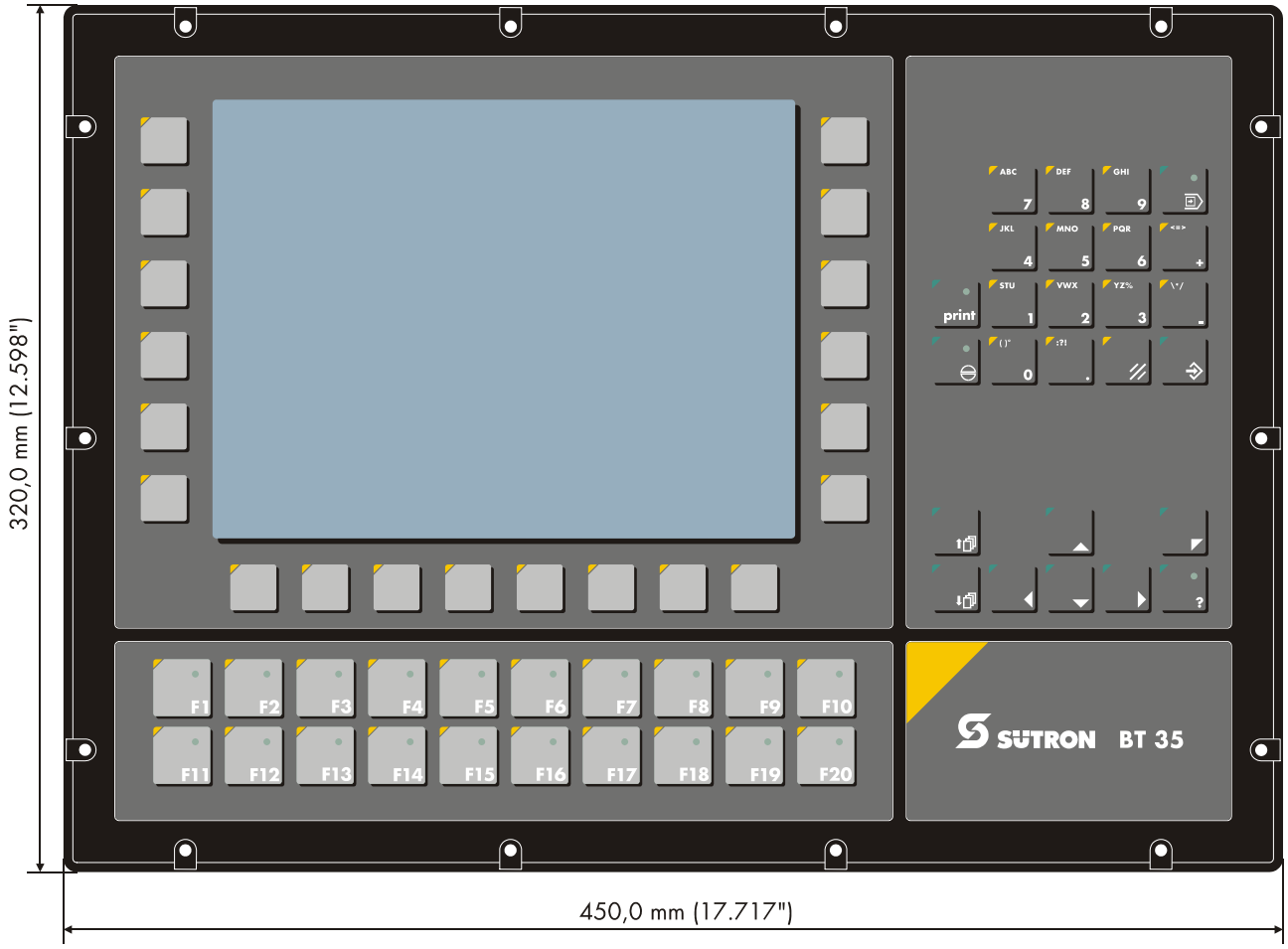



Figure 2-1 Front panel dimensions

### 2.2.2 Mounting Cutout

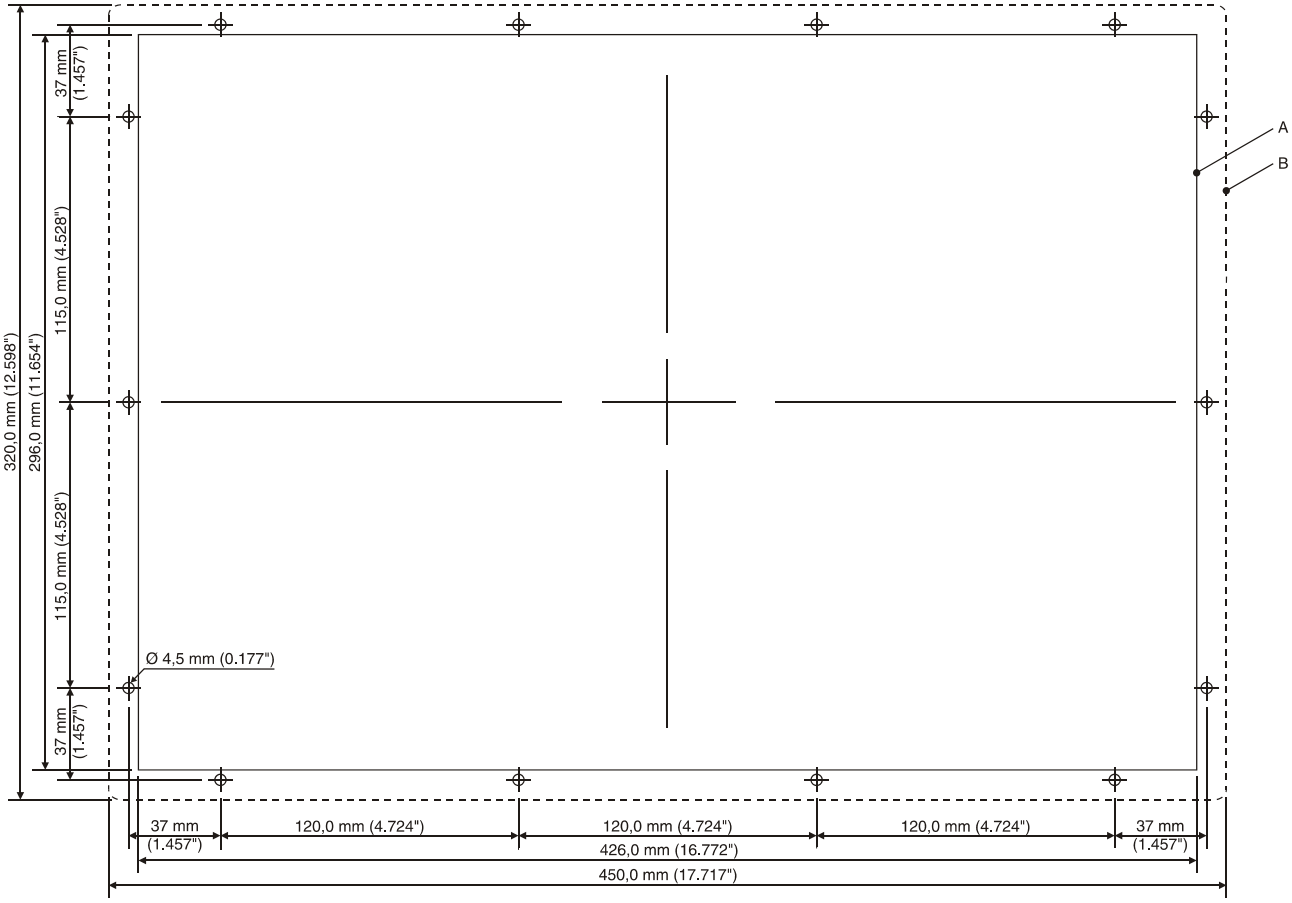



Figure 2-2 Mounting cutout

**A** Mounting Cutout

**B** Front Panel

## 2.2.3 Side View, Mounting Depth

### 2.2.3.1 Standard Device

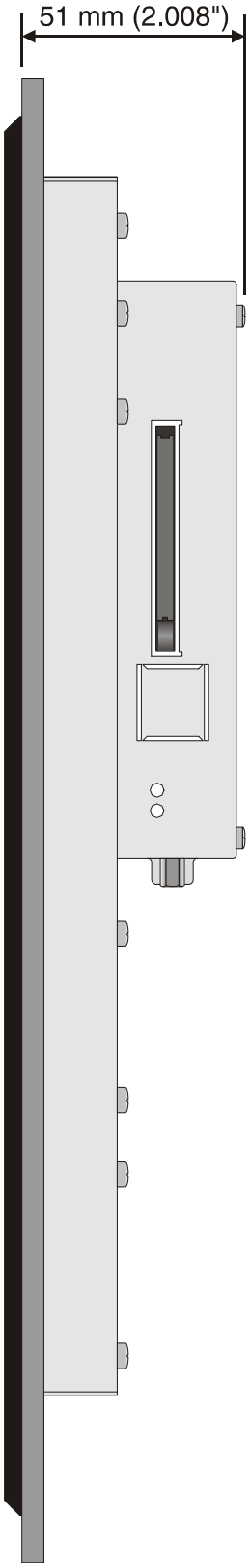



Figure 2-3 Side view and mounting depth for the standard device

#### 2.2.3.2 Field Bus Device

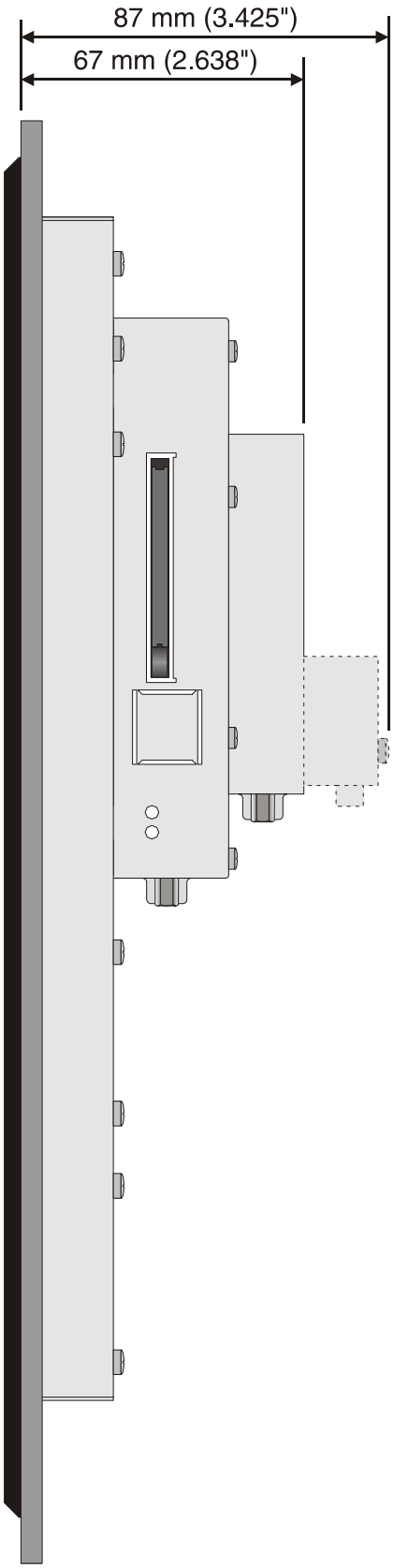



Figure 2-4 Side view and mounting depth for the field bus device

## 2.3 Connecting the Device

### 2.3.1 Supply Voltage 24 V

The supply voltage is supplied via connector X1.A.

The device can optionally be equipped with an additional connector (X1.B). In this case, X1.A is looped through to X1.B and can be used to provide power supply to other components (e.g. bus node). The pin assignment is the same for both connectors.

The maximum continuous current allowed to flow from connector X1.A to X1.B is 5 A. To avoid an overload, an external protection must be installed (e.g. fusible cut-out).

The device has reverse polarity protection. In case of wrong polarity, the device will not operate.

This is a protection class I device. For safe operation, safety extra-low voltage (SELV) in accordance with DIN EN 61131 must be used for the supply voltage.

Connector in the operating device: 3 pin connector Phoenix COMBICON MSTBV 2.5/3-GF

Table 2-1 Pin assignment supply voltage

| Pin | Designation | Function |
|---|---|---|
| 1 | ⏚ | Low-Noise Ground |
| 2 | 0 V | Supply Voltage 0 V |
| 3 | 24 VDC | Supply Voltage 24 VDC |

A suitable female connector strip of the type Phoenix COMBICON MSTB 2.5/3-STF is supplied.

Cables with finely stranded conductors with a minimum cross-section of 0.75 mm² (18 AWG) and a maximum cross-section of 2.5 mm² (14 AWG) must be used for the supply voltage.

Hazardous voltages can exist inside electrical installations that can pose a danger to humans. Coming in contact with live parts **may result in electric shock!**

Use the following procedure to connect the device to the supply voltage:

1. Strip approx. 30 mm (1.181") off the outer cable sheath and approx. 5 mm (0.197") off the wires.

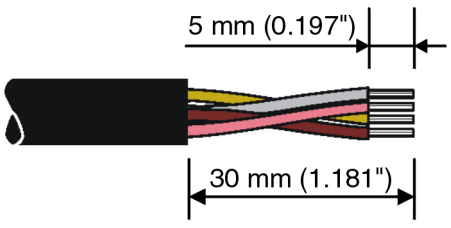



Figure 2-5 Preparing the cable

2. Fit the wires with wire end ferrules and connect the wires to the connector.

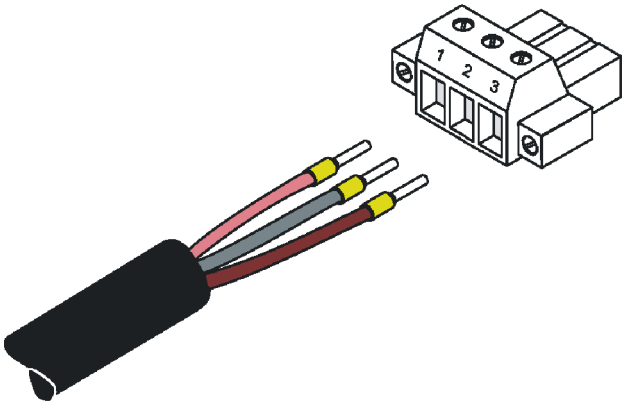



Figure 2-6 Connecting the female connector strip

If shielded connecting cables are used in the supply voltage area, the shield should be connected to pin 1.

3. Plug the female connector strip onto connector X1.A.

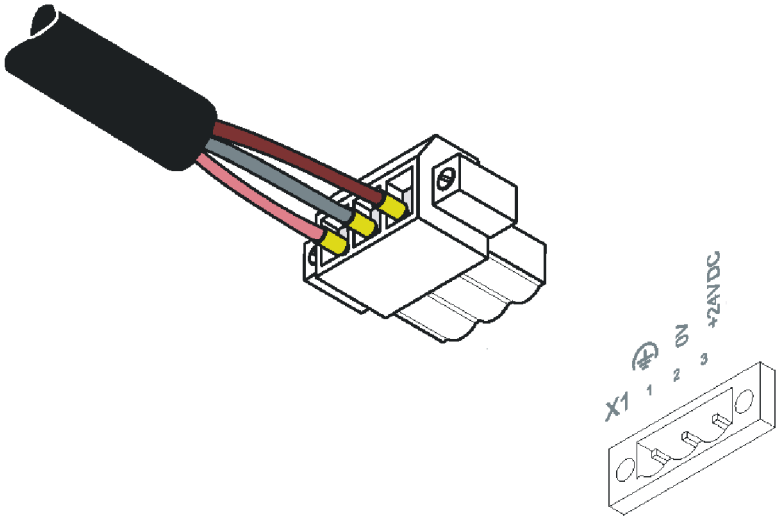



Figure 2-7 Female connector strip is plugged on

4. Secure the female connector strip in place with a screw-type locking to prevent it from slipping out.

A separate conductor must always be provided for the protective grounding at the threaded bolt. The conductor must have a minimum cross-section of 1.5 mm² (16 AWG) and must be kept as short as possible.

## 2.4 Switching the Device on

After you applied the supply voltage, a system test is carried out during which the modules in the operating device are tested and initialized. All status LEDs are activated for a short time. A number of system and error messages can be output by the system test. If the application memory contains a valid project, the first mask, i.e. the „Start mask“ or the mask defined in the TSwin language parameters as the Start-up mask appears on the display.

The „Start mask“ is displayed for 5 seconds. This is a fixed time setting. After this time has elapsed, the „Main mask“ or the mask defined in the language parameters as the Main mask appears on the display. This is the first mask of the operator guidance.

When you push any button while the „Start mask“ is displayed, the „Setup mask“ appears. In this mask you define the parameters for the interfaces and the operating device.

## 2.5 Identification

You can identify the operating device by the nameplate on the rear.

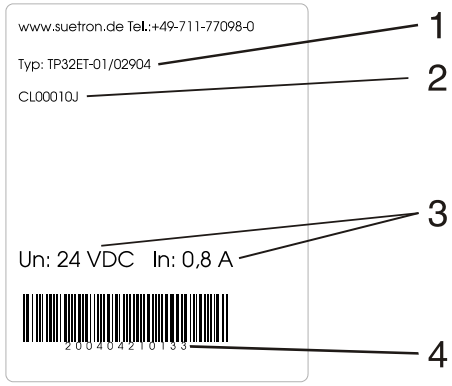



Figure 2-8 Nameplate (example)

**1** Order Number
**2** Firmware Version (Version on Delivery)
**3** Voltage and Current
**4** Serial Number

Depending on the size of the display, you will be able to read various types of information as the operating device is initialized: clock frequency, application memory size, current firmware version, TSwin version, project name, time, date, number of compilation runs and a random number.

Because the initialization mask is visible only for a few seconds there is a possibility to represent this mask for a longer time period.

1. Hold down an arbitrary key at the operating device to generate an error message.
2. Read the firmware version now.
3. Release the key to complete the initialization procedure of the operating device.

# 3 Control and Display Elements

## 3.1 Keyboard

The keys are positioned under an environmental-proof polyester foil. You project the operating principle of the keys in the programming software.

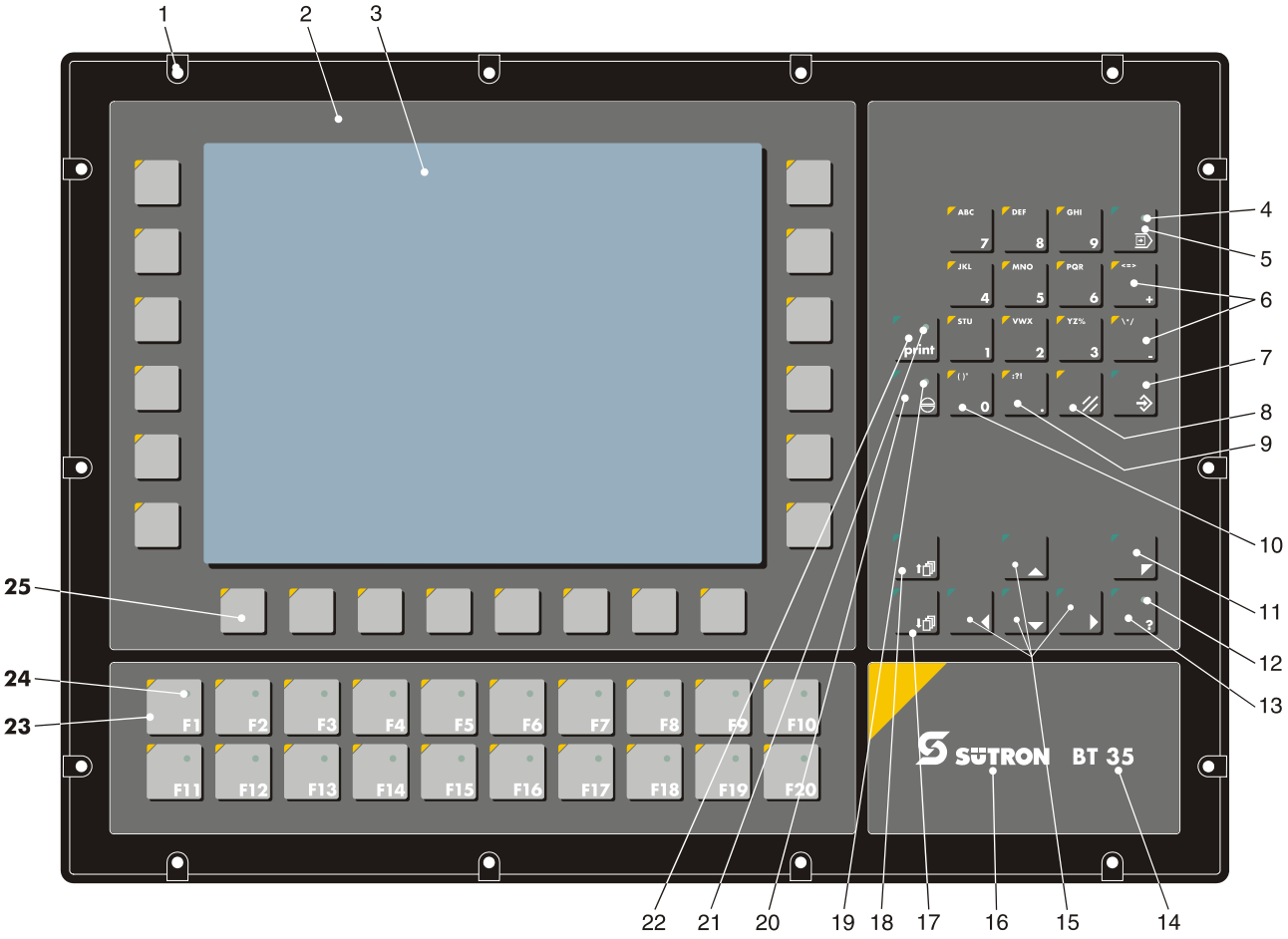
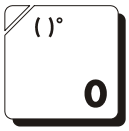



Figure 3-1 Front view

**1** Mounting Hole
**2** Front Panel Cover
**3** Display
**4** Status LED "Data Release"
**5** Special Key "Data Release"
**6** Editing Key Plus / Minus
**7** Special Key "Enter"
**8** Special Key "Delete"
**9** Editing Keys "Decimal Point"
**10** Editing Keys 0 to 9, Alphabet
**11** Control Key "Home"
**12** Status LED "Help"
**13** Special Key "Help"
**14** Device Model

**15** Control Keys "Cursor Left, Right, Up, Down"
**16** Company Logo
**17** Control Key "Page up"
**18** Control Key "Page down"
**19** Status LED "Acknowledge"
**20** Special Key "Acknowledge"
**21** Status LED "Print"
**22** Special Key "Print"
**23** Function Keys F1 to F20
**24** Status LED "Function Key"
**25** Soft key SK1 to SK20

### 3.1.1 Editing Keys




The key **0 and ()**° is used for changing data in the editor. The (, ) and ° characters can be entered when configuring the **Shift** or **ShiftCase** system variables.


The key **1 and STU** is used for changing data in the editor. The characters S, T and U can be entered when configuring the **Shift** or **ShiftCase** system variables.

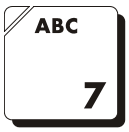

The key **2 and VWX** is used for changing data in the editor. The characters V, W and X can be entered when configuring the **Shift** or **ShiftCase** system variables.


The key **3 and YZ%** is used for changing data in the editor. The characters Y, Z and % can be entered when configuring the **Shift** or **ShiftCase** system variables.


The key **4 and JKL** is used for changing data in the editor. The characters J, K and L can be entered when configuring the **Shift** or **ShiftCase** system variables.


The key **5 and MNO** is used for changing data in the editor. The characters M, N and O can be entered when configuring the **Shift** or **ShiftCase** system variables.


The key **6 and PQR** is used for changing data in the editor. The characters P, Q and R can be entered when configuring the **Shift** or **ShiftCase** system variables.

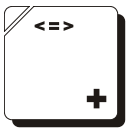



The key **7 and ABC** is used for changing data in the editor. The characters A, B and C can be entered when configuring the **Shift** or **ShiftCase** system variables.

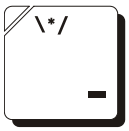

The key **8 and DEF** is used for changing data in the editor. The characters D, E and F can be entered when configuring the **Shift** or **ShiftCase** system variables.


The key **9 and GHI** is used for changing data in the editor. The characters G, H and I can be entered when configuring the **Shift** or **ShiftCase** system variables.


The key **Decimal point and :?!** is used for changing data in the editor. The characters :, ? and ! can be entered when configuring the **Shift** or **ShiftCase** system variables.

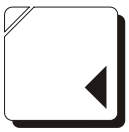



The key **Plus and <=>** is used for changing data in the editor. The characters <, = and > can be entered when configuring the **Shift** or **ShiftCase** system variables.




The key **Minus and */** is used for changing data in the editor. The characters \, * and / can be entered when configuring the **Shift** or **ShiftCase** system variables.

### 3.1.2 Control Keys



The key **Cursor left** can be programmed to directly select adjacent I/O masks. In the editor, it moves the cursor within a variable to the left by one character (character selection).

The key **Cursor right** can be programmed to directly select adjacent nodes and I/O masks. In the editor it moves the cursor one character to the right (character selection).

The key **Cursor up** can be programmed to directly select adjacent nodes and I/O masks. In the editor it moves the cursor up one variable (variable selection).

The key **Cursor down** can be programmed to directly select adjacent I/O masks. In the editor, it moves the cursor downwards to the next variable (variable selection).

The key **Cursor home** can be programmed to directly select higher-level nodes and I/O masks. In the editor it returns the cursor to the first input variable position.

The key **Page up** is used to page through tables, recipes and messages. The functionality corresponds to the system variable TabPgUp. The key allows data content towards the top of the table to be viewed.

The key **Page down** is used to page through tables, recipes and messages. The functionality corresponds to the system variable TabPgDn. The key allows data content towards the bottom of the table to be viewed.

### 3.1.3 Special Keys

The key **Help** always displays the current help text (online help). The help key LED flashes when a system message is pending. The system message is always displayed in plain-text.

The key **Data Release** is used to switch from the menu into the editor. The integrated LED lights up in the editing mode if the external data release has been set. When the Data Release key is pressed within the editor, the editing mode is exited.

The key **Enter** is used to conclude data entry. When pressed while in the Startup Mask, the key switches into the Setup Mask.

The key **Delete** deletes the character beneath the cursor in the editor. Removes the selected messages from the data memory.

The key **Acknowledge** is used as acknowledge key for the message system. The LED flashes when a acknowledge is required.


The key **Print** can be used as a soft key to activate various print jobs. The LED flashes when a print process is active.

### 3.1.4 Function Keys


The function of the function keys is freely assignable (with soft key functions). The function keys can be used either as direct keys for menu control or for triggering a function in the controller.

The function of the soft keys is freely assignable. The function keys can be used either as direct keys for menu control or for triggering a function in the controller.

#### 3.1.4.1 Function Key Arrangement

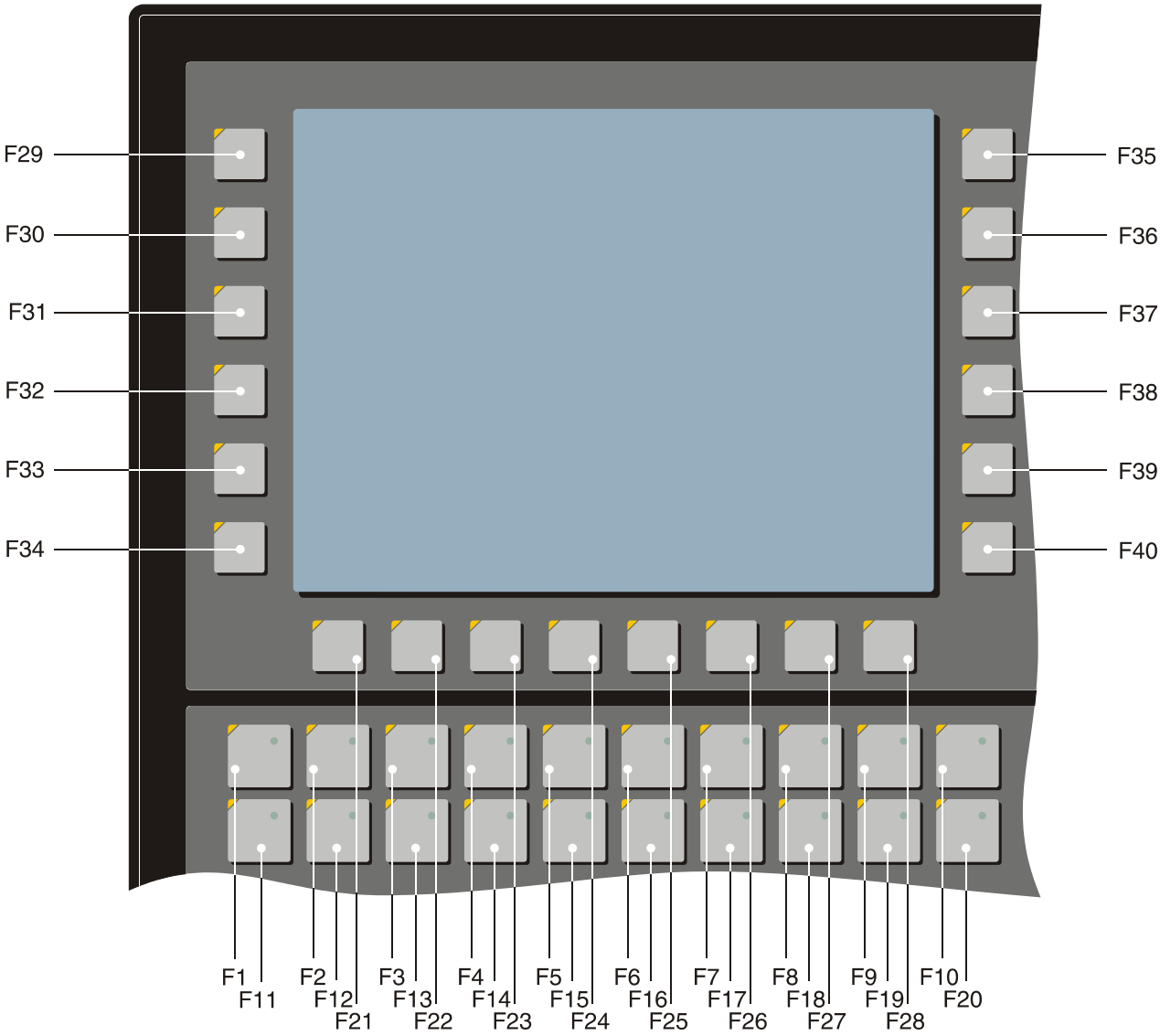



Figure 3-2 Arrangement of the function keys

#### 3.1.4.2 Slide-in Identification Strips for the Function Keys

The identifications strips can be replaced when the operating device is built-in or removed. Inserting the strip from the rear side of the front plate does not influence the specified seal of the operator terminal. A set of identification strips is supplied with the operator terminal.

For the labeling use:

| | |
|---|---|
| Single pieces, prototypes | Label with a water-resistant pen |
| Small series | Copying foil (thickness <= 70 µm) with laser print |
| Large series | Customer-specific labeled identification strips |

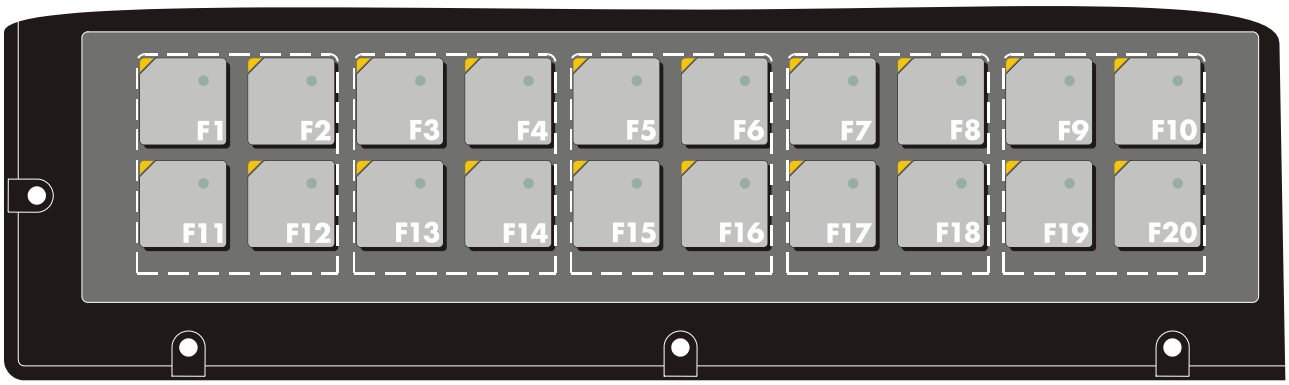



Figure 3-3 Position of the slide-in identifications strips

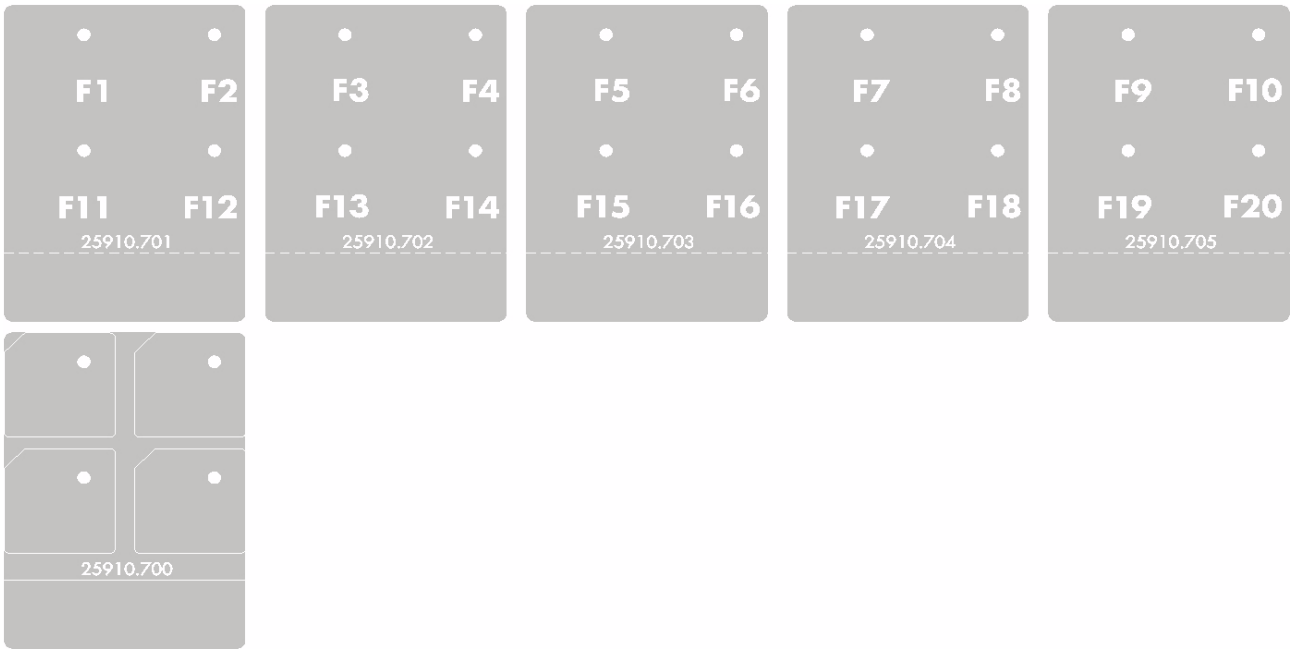



Figure 3-4 Set of slide-in identifications strips

## 3.2 User Mode Switch

The user mode switch is installed at the rear of the operating device.

The switch positions for ON or OFF are shown on the user mode switch.

Table 3-1 User mode switch

| S1 | S2 | S3 | S4 | Function |
|---|---|---|---|---|
| I | X | – | – | Standard mode with PLC (default upon delivery) |
| I | X | I | – | Standard mode without PLC |
| – | I | – | – | Transparent-Mode with start- and stop code of the keys |
| – | – | – | I | Transparent-Mode without stop code of the keys |
| I | – | – | I | Activate download (erases the application memory) and default contrast / brightness setting |
| I | – | I | I | Activate upload |

Legend for table:

I = Switch ON

– = Switch OFF

X = Any switch position

## 3.3 Display

**Danger - Toxic!**
If the display is damaged, avoid touching, swallowing or breathing in the liquids or gases which may leak out!

**Danger - Corrosive!**
If the display is damaged, avoid touching, swallowing or breathing in the liquids or gases which may leak out!

The display type differs depending on the operating device model. Depending on the display version, you can adjust the contrast and brightness.

Table 3-2 Display versions

| Display Type | Order no. | Contrast Setting | Brightness Adjustment |
|---|---|---|---|
| STN (Monochrome) | BTxxEM/xxxxxx | X | - |
| TFT | BTxxET/xxxxxx | - | X |

### 3.3.1 Contrast / Brightness Setting

To define the contrast / brightness setting, set up the system variable **LcdContrast** or **LcdBackLight** in any mask within the programming software.

To do so, follow the instructions listed in the programming software's help topic „How do I specify the contrast / brightness setting for the operating device".

In the programming software, enter the following values as lower and upper limits for the representation type.

Table 3-3 Values for representation type

| System Variable | Lower Limit | Upper Limit | Default Setting |
|---|---|---|---|
| LcdContrast | 0 | + 31 | + 16 |
| LcdBackLight | 0 | + 15 | + 8 |

If you do not configure the system variable **LcdContrast** or **LcdBackLight**, the default setting is used when the device is initialized.

If you did set up the system variable, you can set the contrast / brightness as follows. Enter the mask where you set up the system variable and:

1. Press the contrast / brightness button.
2. Enter a new value for the contrast / brightness. To do so, use the keyboard shown on the screen.
3. Confirm with Enter.

The new contrast / brightness setting becomes effective immediately after the Enter key is pressed. If necessary, repeat the steps two and three until you are satisfied with the contrast / brightness.

### 3.3.2 Default Contrast / Brightness Setting

If the contrast / brightness setting is such that it is no longer possible to read the masks, you can use the user mode switch to reset the contrast / brightness to the default value.

For the table with the switch positions of the user mode switch, see chapter „User Mode Switch“.

The switch position for the default contrast / brightness is identical with the „Activate download via hardware“. The contrast / brightness is reset before a corresponding message is displayed. The warning will be displayed in a legible manner.

To restore the default contrast / brightness:

1. Switch the device off.
2. Set the switches S1 and S4 of the user mode switch to ON.
3. Switch the device on again.
4. When the warning appears, switch the device off again.
5. Set switch S4 to OFF.
6. Then switch the device on again.

The application will not be lost.

### 3.3.3 Character Attributes

The following character attributes can be displayed on the device:

– Normal
– Underlined
– Foreground / background color

### 3.3.4 Fonts

You are able to use the Windows character sets. Further you can use the font "Normal" and the font "Zoom" or create and use your own character sets.

# 4 Interfaces of the Device

The device can either be supplied as a standard device or field bus device.

The universal interface X3 combines several interface standards in one connector. The connector is divided into two channels. The communication channel (SER1) is operated separately from the channel for the upload/download/logging printer/scanner (SER2).

For the communication channel (SER1), the protocol-specific use only allows one of the three interface standards to be used.

Depending on the device variant, several interfaces are available to you:

Table 4-1 Device variants

| Order number | Available interfaces | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | RS232c (X3-SER2) | TTY / 20mA, RS485, RS232c (X3-SER1) | CAN | DeviceNet | INTERBUS | INTERBUS OPC LWL | MPI | PROFIBUS-DP |
| BTxxEx/23xxxx | X | X | - | - | - | - | - | - |
| BTxxEx/25xxxx | X | - | X | - | - | - | - | - |
| BTxxEx/39xxxx | X | - | - | X | - | - | - | - |
| BTxxEx/21xxxx | X | - | - | - | X | - | - | - |
| BTxxEx/26xxxx | X | - | - | - | - | X | - | - |
| BTxxEx/24xxxx | X | - | - | - | - | - | X | - |
| BTxxEx/22xxxx | X | - | - | - | - | - | - | X |

## 4.1 Standard Interfaces

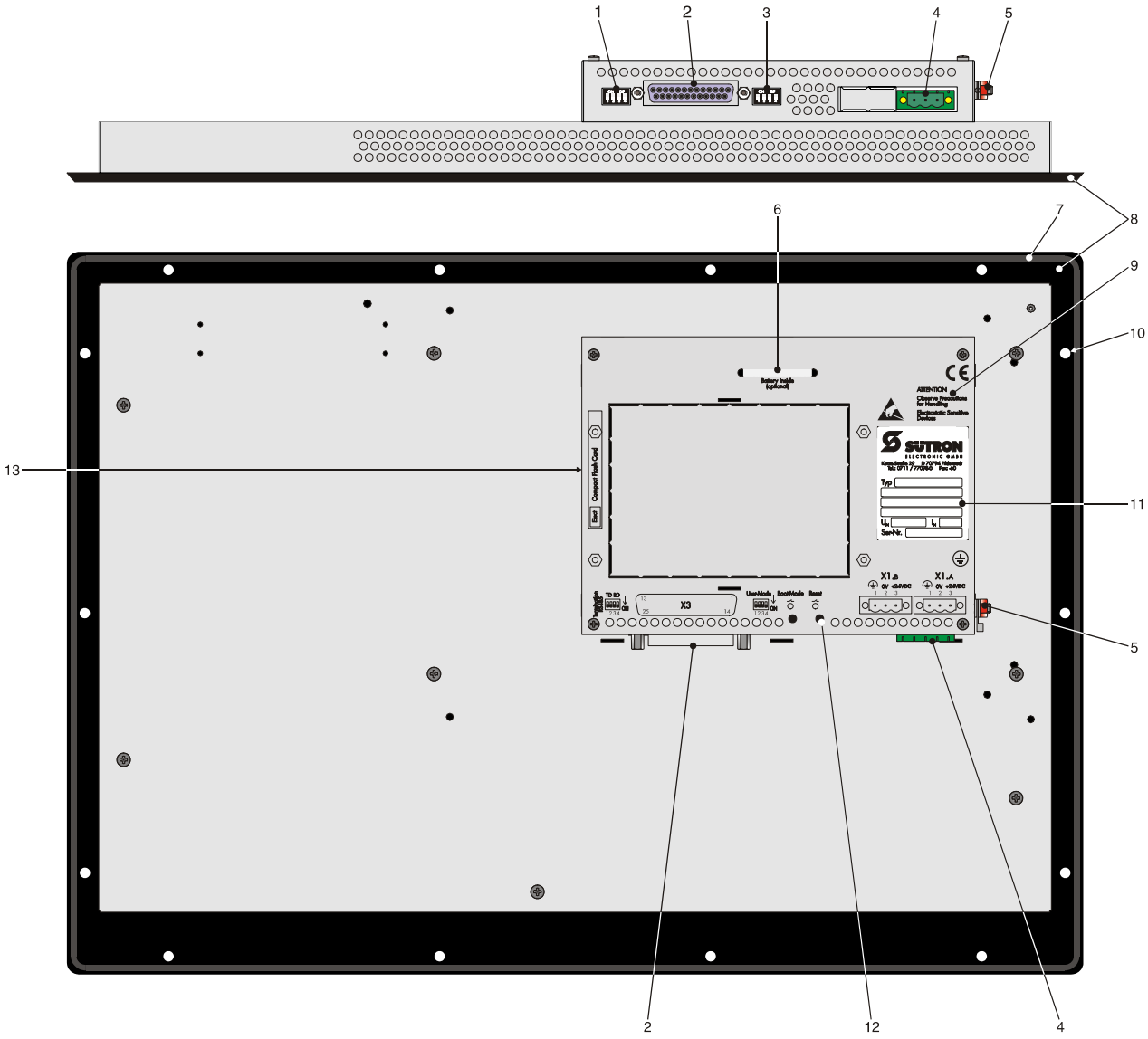



Figure 4-1 Rear view TTY / RS485 / RS232

1. Termination Switch (X3-SER1 RS485)
2. Female Connector X3 (TTY/RS485/RS232c)
3. User Mode Switch
4. Connector X1.A (Supply Voltage)
5. Threaded Bolt for Protective Grounding
6. Cable Fastener for Battery
7. Seal
8. Front Panel
9. Warning
10. Mounting Holes
11. Nameplate
12. Reset Key
13. CompactFlash Slot on the Side

### 4.1.1 TTY / 20 mA Current Loop (X3-SER1)

Depending on the wiring, it is possible to connect the interface either as an active or passive current loop. The transmit line and the receive line are each provided with a separate 20 mA power source. The compliance voltage is approx. 10 VDC.

The 20 mA power should be supplied by the transmitter unit. This decreases crosstalk on the signal lines considerably.

In idle state (signal logic 1), a 20 mA current loop can be measured in the cable.

| | |
|---|---|
| Signal Logic 1 | Current Flow 20 mA |
| Signal Logic 0 | Current Flow Interrupted |

#### 4.1.1.1 Pin Assignment

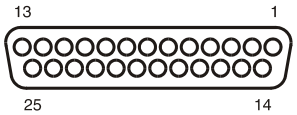



Figure 4-2 25 pin D-SUB female connector strip

Connector in the terminal: 25 pin D-SUB female connector strip.

Table 4-2 Pin assignment TTY / 20 mA, passive

| Pin | Designation | Function |
|---|---|---|
| 10 | T+ | Transmitted Data, Positive Polarity |
| 13 | R+ | Received Data, Positive Polarity |
| 14 | R- | Received Data, Negative Polarity |
| 19 | T- | Transmitted Data, Negative Polarity |

Table 4-3 Pin assignment TTY / 20 mA, active

| Pin | Designation | Function |
|---|---|---|
| 10 | T+ | Transmitted Data, Positive Polarity |
| 12 | S1+ | Power Source 1, Positive Polarity |
| 13 | R+ | Received Data, Positive Polarity |
| 14 | R- | Received Data, Negative Polarity |
| 16 | S2+ | Power Source 2, Positive Polarity |
| 19 | T- | Transmitted Data, Negative Polarity |
| 21 | S1- | Current Sink 1, Negative Polarity |
| 24 | S2- | Current Sink 2, Negative Polarity |

The D-SUB connector strips must be shielded sufficiently.
See chapter “Shielding D-SUB Connectors“ on page 4-27.

#### 4.1.1.2 Termination

For the operation of channel SER1 as a current loop, the termination for the RS485 must be deactivated.

### 4.1.2 RS485 (X3-SER1)

The interface is suitable for point-to-point and for multi-point connections.

The wires belonging together are marked with „A“ and „B“. Some descriptions refer to the pins with „+“ and „-“ , where A = + and B = -.

| | |
|---|---|
| Signal Logic 1 | $U_A$ - $U_B$ <= -0.3 V i.e. ($U_A$ < $U_B$) |
| Signal Logic 0 | $U_A$ - $U_B$ >= +0.3 V i.e. ($U_A$ > $U_B$) |

#### 4.1.2.1 Pin Assignment

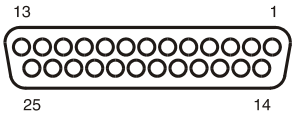



Figure 4-3 25 pin D-SUB female connector strip

Connector in the operating terminal: 25-pin D-SUB female connector

Table 4-4 Pin assignment RS422/RS485

| Pin | Designation | Function |
|---|---|---|
| 8 | T(A) | Transmitted Data (+) |
| 9 | T(B) | Transmitted Data (-) |
| 11 | SGND | Signal Ground |
| 22 | R(A) | Received Data (+) |
| 23 | R(B) | Received Data (-) |

The D-SUB connector strips must be shielded sufficiently.
See chapter “Shielding D-SUB Connectors“ on page 4-27.

#### 4.1.2.2 Termination

For point-to-point connections, always activate the termination. For multipoint connections, only activate the termination at the cable end.

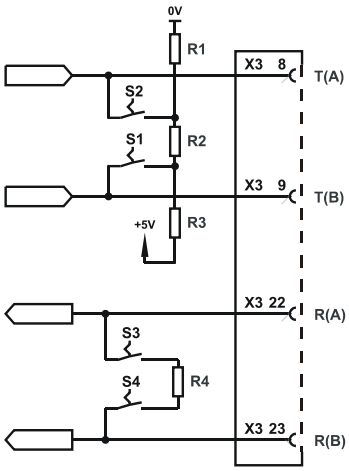



Figure 4-4 Block diagram termination RS422 / RS485

Table 4-5 Resistor values - termination RS422 / RS485

| Designation | Value |
|---|---|
| R1, R3 | 510 Ohm |
| R2 | 150 Ohm |
| R4 | 120 Ohm |

The switch positions for ON or OFF are printed onto the termination switch. Only the specified switch positions are allowed.

Table 4-6 Termination switch

| S1 | S2 | S3 | S4 | Function |
|---|---|---|---|---|
| Transmitter | | Receiver | | |
| I | I | I | I | Termination is ON |
| – | – | – | – | Termination is OFF |

Legend for table:

I = Switch ON

- = Switch OFF

### 4.1.3 RS232 (X3-SER1)

The interface is suitable to establish a point-to-point connection.

#### 4.1.3.1 Pin Assignment

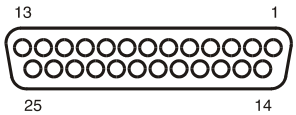



Figure 4-5 25 pin D-SUB female connector strip

Connector in the terminal: 25 pin D-SUB female connector strip.

Table 4-7 Pin assignment RS232

| Pin | Designation | Function |
|---|---|---|
| 6 | TD | Transmitted Data |
| 15 | CTS | Clear to Send |
| 17 | RTS | Request to Send |
| 18 | RD | Received Data |
| 25 | SGND | Signal Ground |

The D-SUB connector strips must be shielded sufficiently.
See chapter “Shielding D-SUB Connectors“ on page 4-27.

#### 4.1.3.2 Termination

For the operation of channel SER1 as a RS232, the termination for the RS485 must be OFF.

### 4.1.4 RS232 (X3-SER2)

The interface is only designed to be used for downloads, uploads, a scanner or a logging printer because the interface is not electrically isolated.

#### 4.1.4.1 Pin Assignment

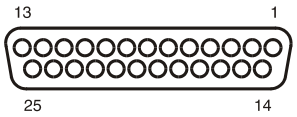



Figure 4-6 25 pin D-SUB female connector strip

Connector in the operating device: 25 pin D-SUB female connector strip.

Table 4-8 Pin assignment RS232

| Pin | Designation | Function |
|---|---|---|
| 1 | ⏚ | Low-Noise Ground |
| 2 | TD | Transmitted Data |
| 3 | RD | Received Data |
| 4 | RTS | Request to Send |
| 5 | CTS | Clear to Send |
| 7 | SGND | Signal Ground |

The D-SUB connector strips must be shielded sufficiently.
See chapter “Shielding D-SUB Connectors“ on page 4-27.

## 4.2 Field Bus Interfaces

### 4.2.1 CAN (X2.1/X2.2)

The opto decoupled interface for CAN bus connections is available to integrate the device into a CAN structure. The CAN bus is a high speed bus in accordance with ISO-DIS 11898.

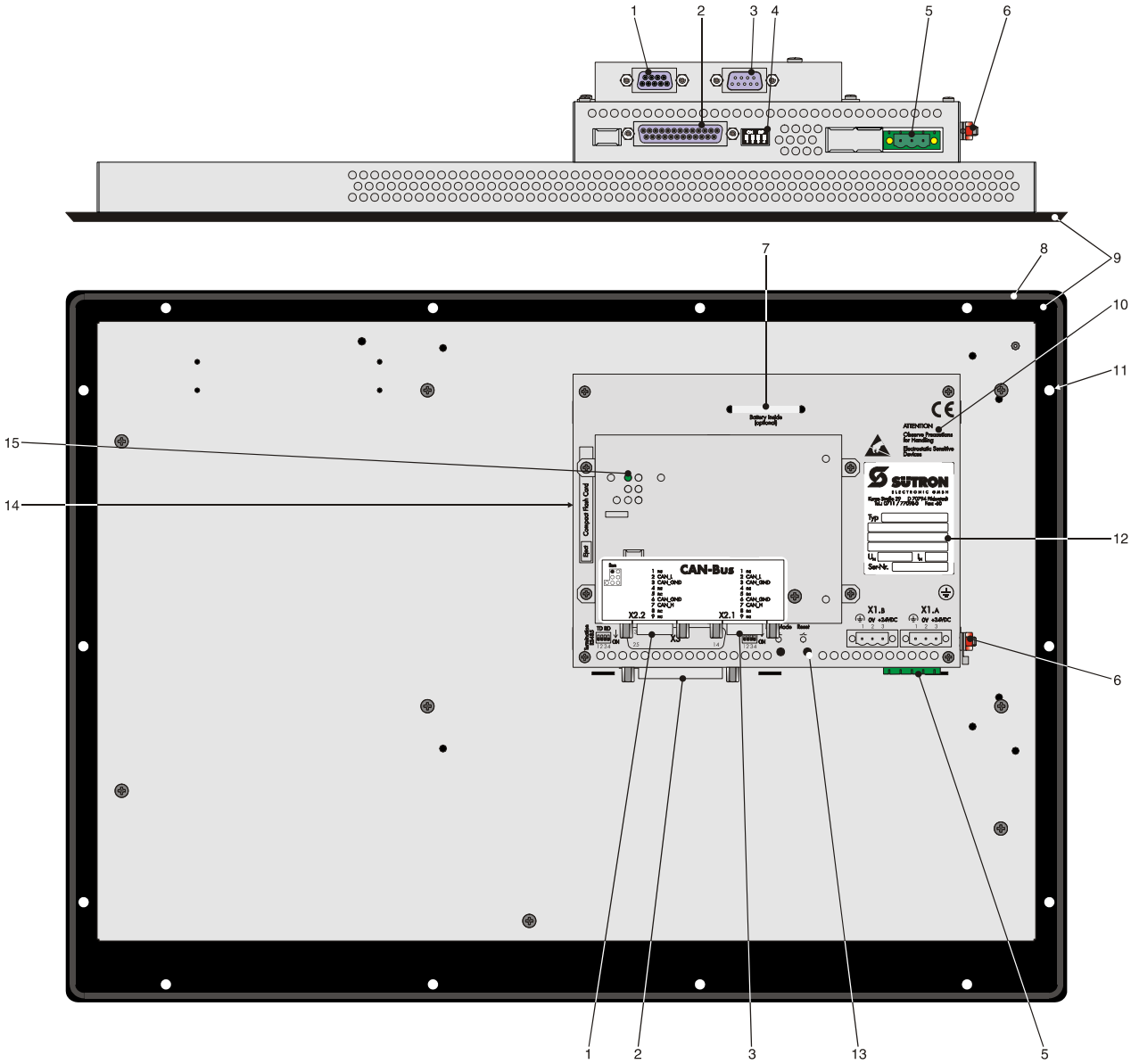



Figure 4-7 Rear view CAN

1. Female Connector X2.2 (CAN Bus)
2. Female Connector X3 (SER2 RS232c)
3. Connector X2.1 (CAN Bus)
4. User Mode Switch
5. Connector X1.A (Supply Voltage)
6. Threaded Bolt for Protective Grounding
7. Cable Fastener for Battery
8. Seal
9. Front Panel
10. Warning
11. Mounting Holes
12. Nameplate
13. Reset Key
14. CompactFlash Slot on the Side
15. Diagnostics LED

#### 4.2.1.1 Pin Assignment

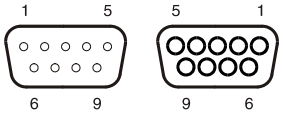



Figure 4-8 9 pin D-SUB male connector strip and female connector strip

Connector in the terminal: 9 pin D-SUB male and female connector strip (assignment for male and female connector strip is the same.)

Table 4-9 Pin assignment CAN bus

| Pin | Designation | Function |
|---|---|---|
| 1 | nc | Not Connected |
| 2 | CAN_L | CAN_L Bus Line (Dominant LOW) |
| 3 | CAN_GND | CAN Ground |
| 4 | nc | Not Connected |
| 5 | nc | Not Connected |
| 6 | CAN_GND | CAN Ground |
| 7 | CAN_H | CAN_H Bus Line (Dominant HIGH) |
| 8 | nc | Not Connected |
| 9 | nc | Not Connected |

All signal lines are looped through from X2.1 to X2.2. The connecting cables should be connected to every pin, including the reserved pins. In this way, the cables can still be used in case of future bus specification extensions.

The D-SUB connector strips must be shielded sufficiently.
See chapter “Shielding D-SUB Connectors“ on page 4-27.

#### 4.2.1.2 Cable

A shielded twisted-pair cable (cable type LiYCY-TP) complying with ISO 11898 must be used.

The cable must have the following characteristics:

Table 4-10 Cable characteristics CAN

| Parameters | Value |
|---|---|
| Impedance | Min.: 108 Ohm<br>Nom.: 120 Ohm<br>Max.: 132 Ohm |
| Specific Resistance | 70 mOhm/m |
| Specific Line Delay | 5 ns/m |

The maximum cable length depends on the baud rate used.

Table 4-11 Baud rate CAN

| Baud rate | Cable length |
|---|---|
| 20 kBit/s | 1000 m |
| 125 kBit/s | 500 m |
| 250 kBit/s | 250 m |
| 500 kBit/s | 100 m |
| 1000 kBit/s | 25 m |

#### 4.2.1.3 Termination

Terminate the CAN bus at both ends by terminating resistors (120 Ohm).

#### 4.2.1.4 Diagnostic

A diagnostics LED is located at the rear of the operating device. The LED shows a state of the bus system.

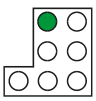


Figure 4-9 Arrangement of the CAN diagnostics LED

The diagnostics LED at the operating device has the following functions:

Table 4-12 Function of the CAN diagnostics LED

| Color | State | Function |
|---|---|---|
| Green | Off | Terminal Disconnected from Bus |
| Green | On | Communication Active |
| Green | Flashing | Sporadic Bus Error |

### 4.2.2 DeviceNet (X2.1/X2.2)

The opto-decoupled interfaces are available to integrate the device into a CAN structure. The CAN bus is designed as a high speed bus in accordance with ISO-DIS 11898.

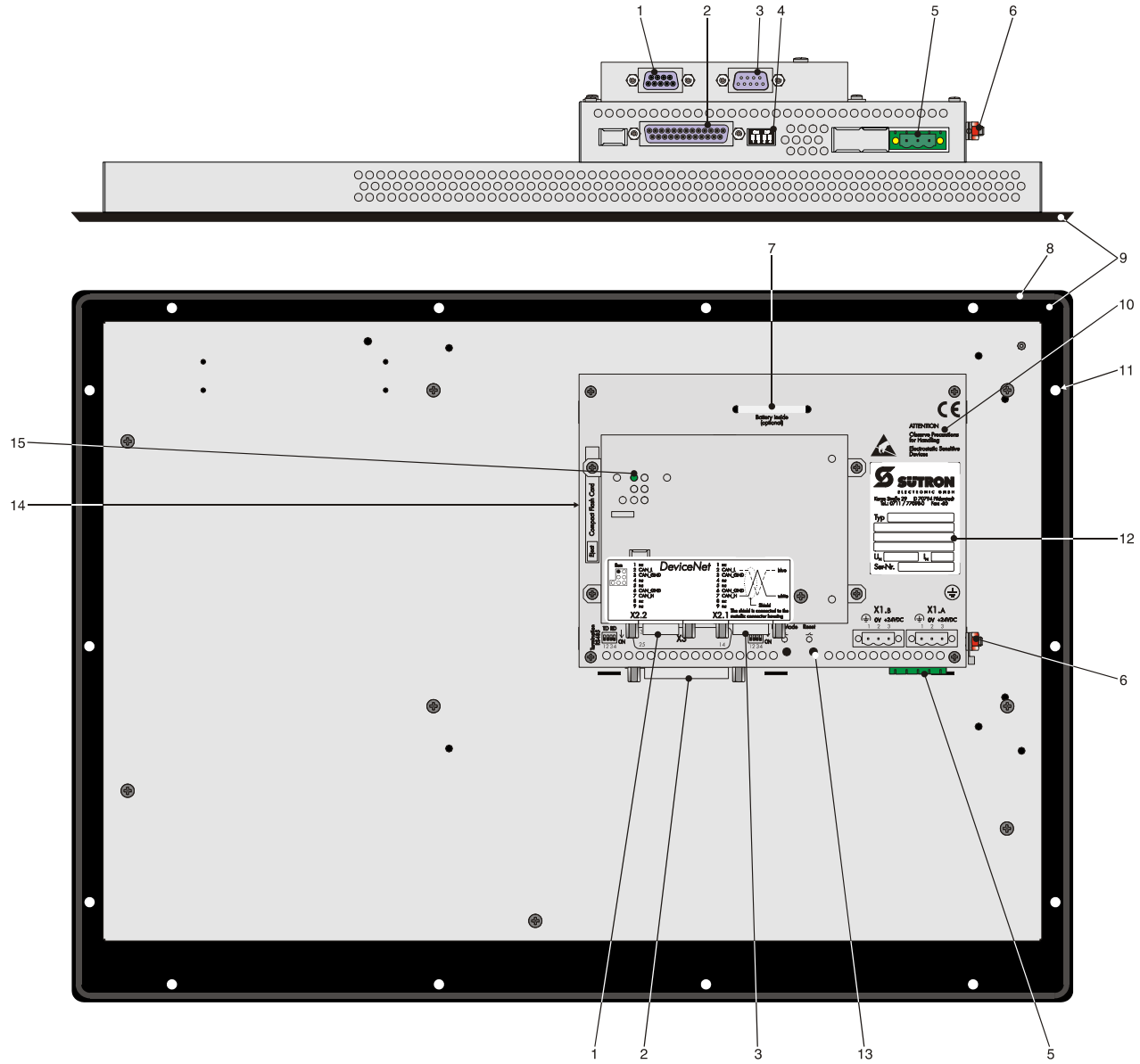



Figure 4-10 Rear view DeviceNet

1. Female Connector X2.2 (DeviceNet)
2. Female Connector X3 (SER2 RS232c)
3. Connector X2.1 (DeviceNet)
4. User Mode Switch
5. Connector X1.A (Supply Voltage)
6. Threaded Bolt for Protective Grounding
7. Cable Fastener for Battery
8. Seal
9. Front Panel
10. Warning
11. Mounting Holes
12. Nameplate
13. Reset Key
14. CompactFlash Slot on the Side
15. Diagnostics LED

#### 4.2.2.1 Pin Assignment

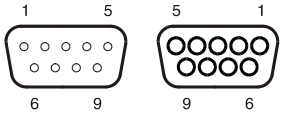



Figure 4-11 9 pin D-SUB male connector strip and female connector strip

Connector in the terminal: 9 pin D-SUB male and female connector strip (assignment for male and female connector strip is the same.)

Table 4-13 Pin assignment CAN bus

| Pin | Designation | Function |
|---|---|---|
| 1 | nc | Not Connected |
| 2 | CAN_L | CAN_L Bus Line (Dominant LOW) |
| 3 | CAN_GND | CAN Ground |
| 4 | nc | Not Connected |
| 5 | nc | Not Connected |
| 6 | CAN_GND | CAN Ground |
| 7 | CAN_H | CAN_H Bus Line (Dominant HIGH) |
| 8 | nc | Not Connected |
| 9 | nc | Not Connected |

All signal lines are looped through from X2.1 to X2.2. The connecting cables should be connected to every pin, including the reserved pins. In this way, the cables can still be used in case of future bus specification extensions.

The D-SUB connector strips must be shielded sufficiently.
See chapter “Shielding D-SUB Connectors“ on page 4-27.

#### 4.2.2.2 Cable

A DeviceNet-certified cable must be used.

Table 4-14 Data line DeviceNet

| Cable Type | Loop Resistance | Surge Impedance | Capacitance per Unit Length |
|---|---|---|---|
| 2 x 1.1 mm | < 22.6 Ohm/km | 120 Ohm | < 39.4 pf/m |
| 2 x 0.6 mm | < 91.8 Ohm/km | 120 Ohm | < 39.4 pf/m |

The maximum length allowed for spur lines connected to the bus cable is 6 meters. The overall length of the bus cable including all spur lines is not to exceed the maximum length listed in the table below.

The maximum cable length depends on the baud rate and the cable type used.

Table 4-15 Baud rate DeviceNet

| Baud Rate | Cable Type | Cable Length |
|---|---|---|
| 125 kBit/s | 2 x 1.1 mm | 500 m |
| | 2 x 0.6 mm | 100 m |
| 250 kBit/s | 2 x 1.1 mm | 250 m |
| | 2 x 0.6 mm | 100 m |
| 500 kBit/s | 2 x 1.1 mm | 100 m |
| | 2 x 0.6 mm | 100 m |

#### 4.2.2.3 Termination

Terminate the CAN bus at both ends by terminating resistors (120 Ohm).

#### 4.2.2.4 Diagnostic

A diagnostics LED is located at the rear of the operating device. The LED shows the states of the bus system.

Figure 4-12 Arrangement of the DeviceNet diagnostics LED

The diagnostics LED at the operating device has the following functions:

Table 4-16 Function of the CAN diagnostics LED

| Color | State | Function |
|---|---|---|
| Green | Off | Terminal Disconnected from Bus |
| Green | On | Communication Active |
| Green | Flashing | Sporadic Bus Error |

### 4.2.3 INTERBUS (X2.1/X2.2)

The device can be integrated into the INTERBUS using the interfaces available for INTERBUS connections.

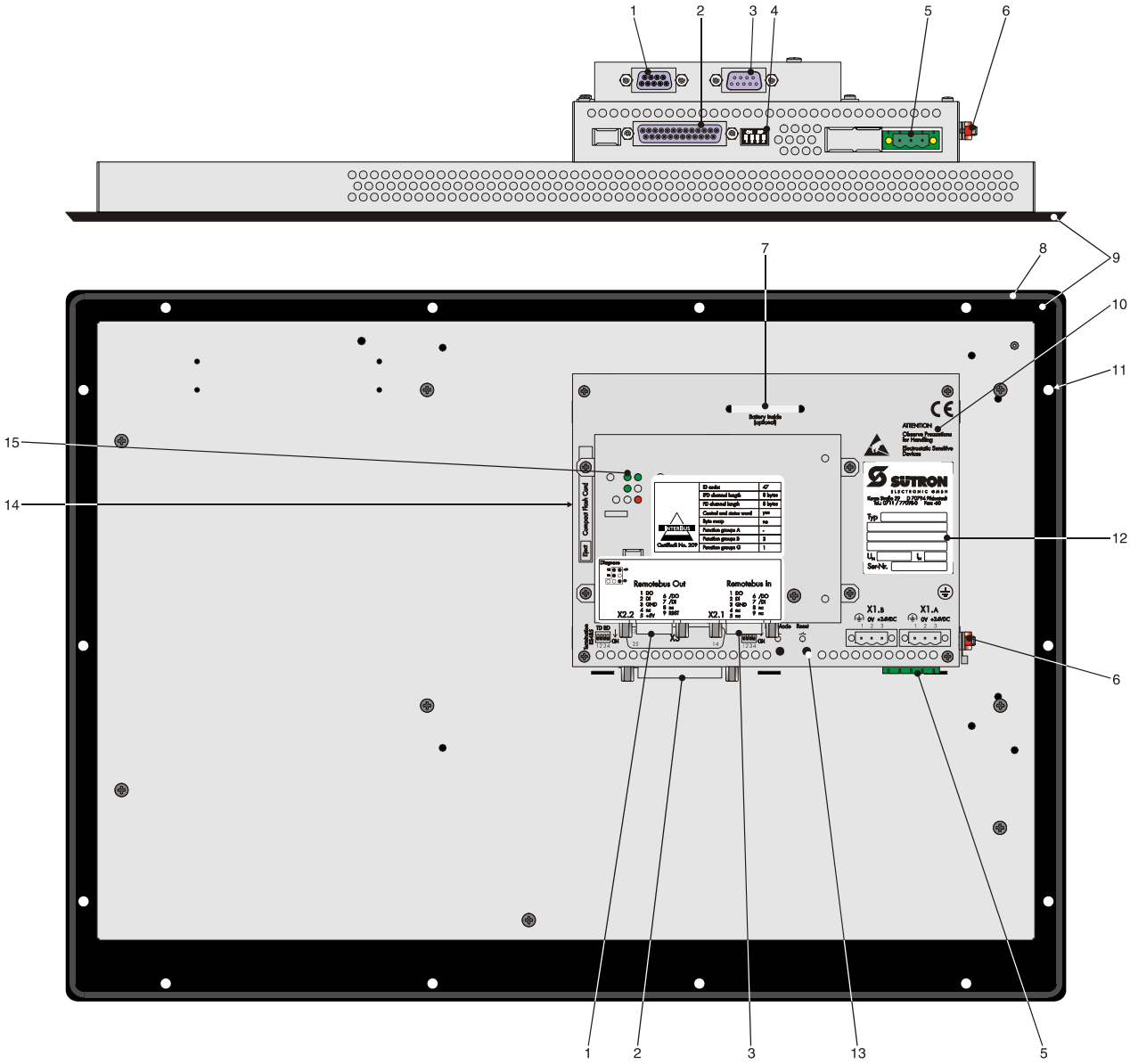



Figure 4-13 Rear view INTERBUS

1. Female Connector X2.2 (Remotebus Out)
2. Female Connector X3 (SER2 RS232c)
3. Connector X2.1 (Remotebus In)
4. User Mode Switch
5. Connector X1.A (Supply Voltage)
6. Threaded Bolt for Protective Grounding
7. Cable Fastener for Battery
8. Seal
9. Front Panel
10. Warning
11. Mounting Holes
12. Nameplate
13. Reset Key
14. CompactFlash Slot on the Side
15. Diagnostics LEDs

#### 4.2.3.1 Pin Assignment

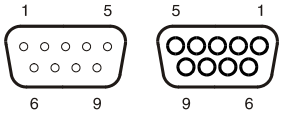



Figure 4-14 9 pin D-SUB male connector strip and female connector strip

Connector in the terminal: 9 pin D-SUB male connector strip for remote bus in.

Table 4-17 Pin assignment remote bus in (INTERBUS)

| Pin | Designation | Function |
|---|---|---|
| 1 | DO | Data Input |
| 2 | DI | Data Output |
| 3 | GND | Ground |
| 4 | nc | Not Connected |
| 5 | nc | Not Connected |
| 6 | /DO | Data Input, Inverted |
| 7 | /DI | Data Output, Inverted |
| 8 | nc | Not Connected |
| 9 | nc | Not Connected |

Connector in the terminal: 9 pin D-SUB female connector strip for remote bus out.

Table 4-18 Pin assignment remote bus out (INTERBUS)

| Pin | Designation | Function |
|---|---|---|
| 1 | DO | Data Output |
| 2 | DI | Data Input |
| 3 | GND | Ground |
| 4 | nc | Not Connected |

Table 4-18 Pin assignment remote bus out (INTERBUS)

| Pin | Designation | Function |
|---|---|---|
| 5 | +5 V | Power Supply +5 VDC |
| 6 | /DO | Data Output, Inverted |
| 7 | /DI | Data Input, Inverted |
| 8 | nc | Not Connected |
| 9 | RBST | Remote Bus Status |

The D-SUB connector strips must be shielded sufficiently.
See chapter “Shielding D-SUB Connectors“ on page 4-27.

#### 4.2.3.2 Cable

A shielded twisted-pair cable (cable type LiYCY-TP) must be used. The maximum cable length depends on its use within the INTERBUS topology.

#### 4.2.3.3 Diagnostic

The diagnostics LEDs are located at the rear of the operating device. The LEDs show the states of the bus system.

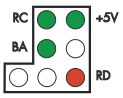



Figure 4-15 Arrangement of the INTERBUS diagnostics LEDs

The diagnostics LEDs at the operating device has the following functions:

Table 4-19 Functions of the INTERBUS diagnostics LEDs

| Designation | Color | State | Function |
|---|---|---|---|
| RC | Green | On | Remote Bus Check |
| +5 V | Green | On | Supply Voltage OK |
| | | Off | No Supply Voltage |
| BA | Green | On | Bus Active |
| | | Off | Bus Not Active |
| RD | Red | On | Remote Bus Inactive |

### 4.2.4 INTERBUS OPC LWL (DO1/DI1/DO2/DI2)

The device can be integrated into an INTERBUS device bus using the interfaces available for INTERBUS OPC LWL connection.

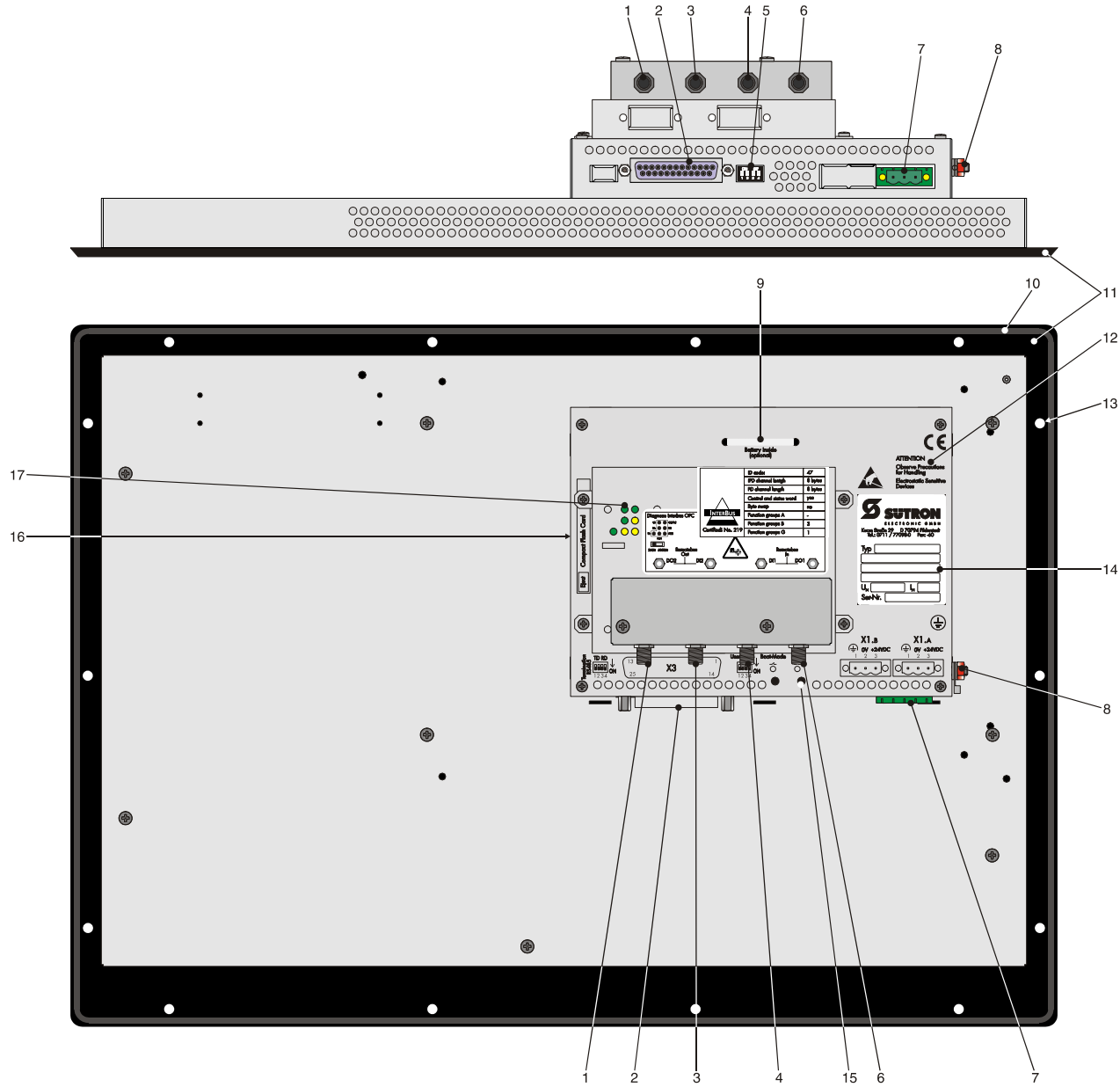



Figure 4-16 Rear view INTERBUS OPC LWL

1. OPC LWL Interface DO2 (Remotebus Out)
2. Female Connector X3 (SER2 RS232c)
3. OPC LWL Interface DI2 (Remotebus Out)
4. OPC LWL Interface DI1 (Remotebus In)
5. User Mode Switch
6. OPC LWL Interface DO1 (Remotebus In)
7. Connector X1.A (Supply Voltage)
8. Threaded Bolt for Protective Grounding
9. Cable Fastener for Battery
10. Seal
11. Front Panel
12. Warning
13. Mounting Holes
14. Nameplate
15. Reset Key
16. CompactFlash Slot on the Side
17. Diagnostics LEDs


Never look directly into the open end of an optical fiber cable. **Infrared light can cause damage to the retina of the eye.** Fit the open ends of an optical fiber cable and the connections with protective caps. Wear protective goggles.

The sending and receiving units can be rendered unusable by dirt accumulation. For this reason, place protective caps onto the connections when the units are not used or are transported! Wear protective goggles.

#### 4.2.4.1 Connector Pin Assignment

The optical fiber interface is designed as a FSMA type 905.

Table 4-20 Assignment INTERBUS OPC LWL

| Designation | Function |
|---|---|
| DO1 | Remote Bus In |
| DI1 | Remote Bus In |
| DO2 | Remote Bus Out |
| DI2 | Remote Bus Out |

#### 4.2.4.2 Cable

The cables are connected in accordance with the "INTERBUS Fiber Optic Installation Guidelines".

Suitable for optical transmission is a dielectric waveguide with step index refractive index profile - a polymer fiber with a core diameter of 980 µm and a cladding diameter of 1000 µm. The F-SMA connector is specified in IEC 874-2 or in DIN 47258, respectively.

The maximum distance between two remote bus users is 50 m (164.042 ft.).

#### 4.2.4.3 Diagnostic

The diagnostics LEDs are located at the rear of the operating device. The LEDs show the states of the bus system.

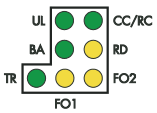



Figure 4-17 Arrangement of the INTERBUS OPC LWL diagnostics LEDs

The diagnostics LEDs at the operating device has the following functions:

Table 4-21 Functions of the INTERBUS OPC LWL diagnostics LEDs

| Designation | Color | State | Function |
|---|---|---|---|
| UL | Green | On | Supply Voltage OK |
| | | Off | No Supply Voltage |
| CC/RC | Green | On | Remote Bus Cable Check |
| BA | Green | On | Bus Active |
| | | Off | Bus Not Active |
| RD | Yel-low | On | Remote Bus Inactive |
| TR | Green | On | PCP Active |
| | | Off | PCP Not Active |
| FO1 | Yel-low | On | Incoming Optical Fiber Path Not OK |
| | | Off | Incoming Optical Fiber Path OK |
| FO2 | Yel-low | On | Outgoing Optical Fiber Path Not OK |
| | | Off | Outgoing Optical Fiber Path OK |

### 4.2.5 MPI (X2)

The device can be integrated into a Siemens MPI bus structure using the interface available for Siemens MPI connections.

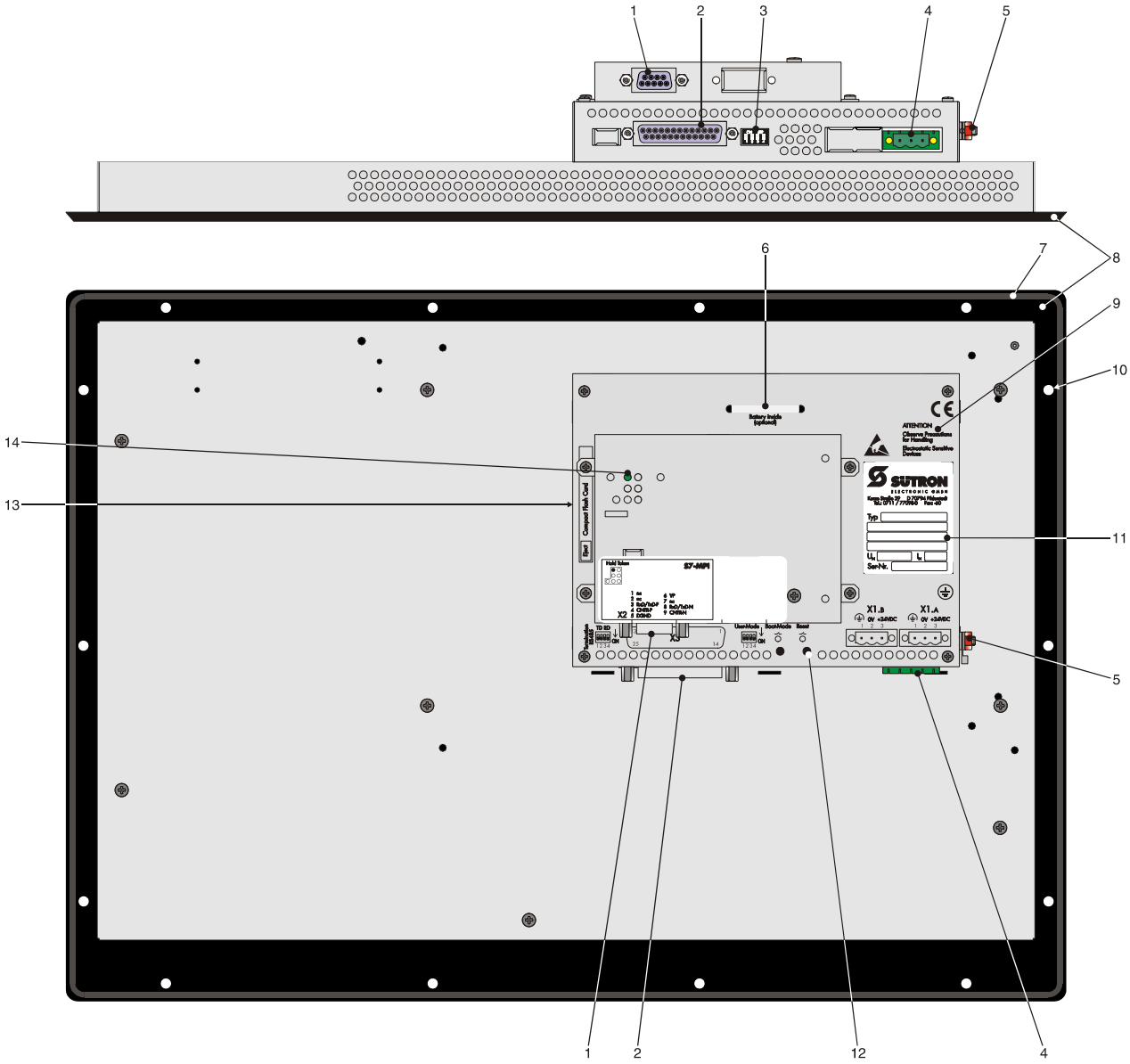



Figure 4-18 Rear View MPI

1. Female Connector X2 (MPI)
2. Female Connector X3 (SER2 RS232c)
3. User Mode Switch
4. Connector X1.A (Supply Voltage)
5. Threaded Bolt for Protective Grounding
6. Cable Fastener for Battery
7. Seal
8. Front Panel
9. Warning
10. Mounting Holes
11. Nameplate
12. Reset Key
13. CompactFlash Slot on the Side
14. Diagnostics LED

#### 4.2.5.1 Pin Assignment

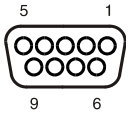



Figure 4-19 9 pin D-SUB female connector strip

Connector in the terminal: 9 pin D-SUB female connector

Table 4-22 Pin assignment MPI

| Pin | Designation | Function |
|---|---|---|
| 1 | nc | Not Connected |
| 2 | nc | Not Connected |
| 3 | RxD/TxD-P | Received Data / Transmitted Data Plus |
| 4 | CNTR-P | Repeater Control Signal Plus |
| 5 | DGND | Data Transmission Potential |
| 6 | VP | Supply Voltage of Terminators Plus |
| 7 | nc | Not Connected |
| 8 | RxD/TxD-N | Received Data / Transmitted Data Minus |
| 9 | CNTR-N | Repeater Control Signal Minus |

The D-SUB connector strips must be shielded sufficiently.
See chapter “Shielding D-SUB Connectors“ on page 4-27.

#### 4.2.5.2 Cable

Any cable that conforms with the following parameters can be used:

Table 4-23 Cable characteristics MPI

| Parameters | Value |
|---|---|
| Loop Resistance | 110 Ohm/km |
| Capacitance | 30 nF/km |
| Surge Impedance | 150 Ohm |

The maximum length of one segment is 50 m which cannot be exceeded. This 50 m applies from the first node to the last node in the segment.

For further information on the installation, please refer to the Siemens manual "SIMATIC S7-400 and M7-400 Programmable Controllers Hardware and Installation, 6ES7498-8AA03-8BA0".

#### 4.2.5.3 Termination

The bus line is terminated at the connector.
For point-to-point connections, always activate the termination. For multi-point connections, only activate the termination at the cable end. For spur lines, always deactivate the termination.

#### 4.2.5.4 Diagnostic

A diagnostics LED is located at the rear of the operating device. The LED shows a state of the bus system.

Figure 4-20 Arrangement of the MPI diagnostics LED

The diagnostics LED at the operating device has the following function:

Table 4-24 Function of the MPI diagnostics LED

| Color | State | Function |
|---|---|---|
| Green | Flashing | Operating Device has the Token |

### 4.2.6 PROFIBUS-DP (X2)

The interface for PROFIBUS-DP connections is available to integrate the device into a PROFIBUS-DP structure.

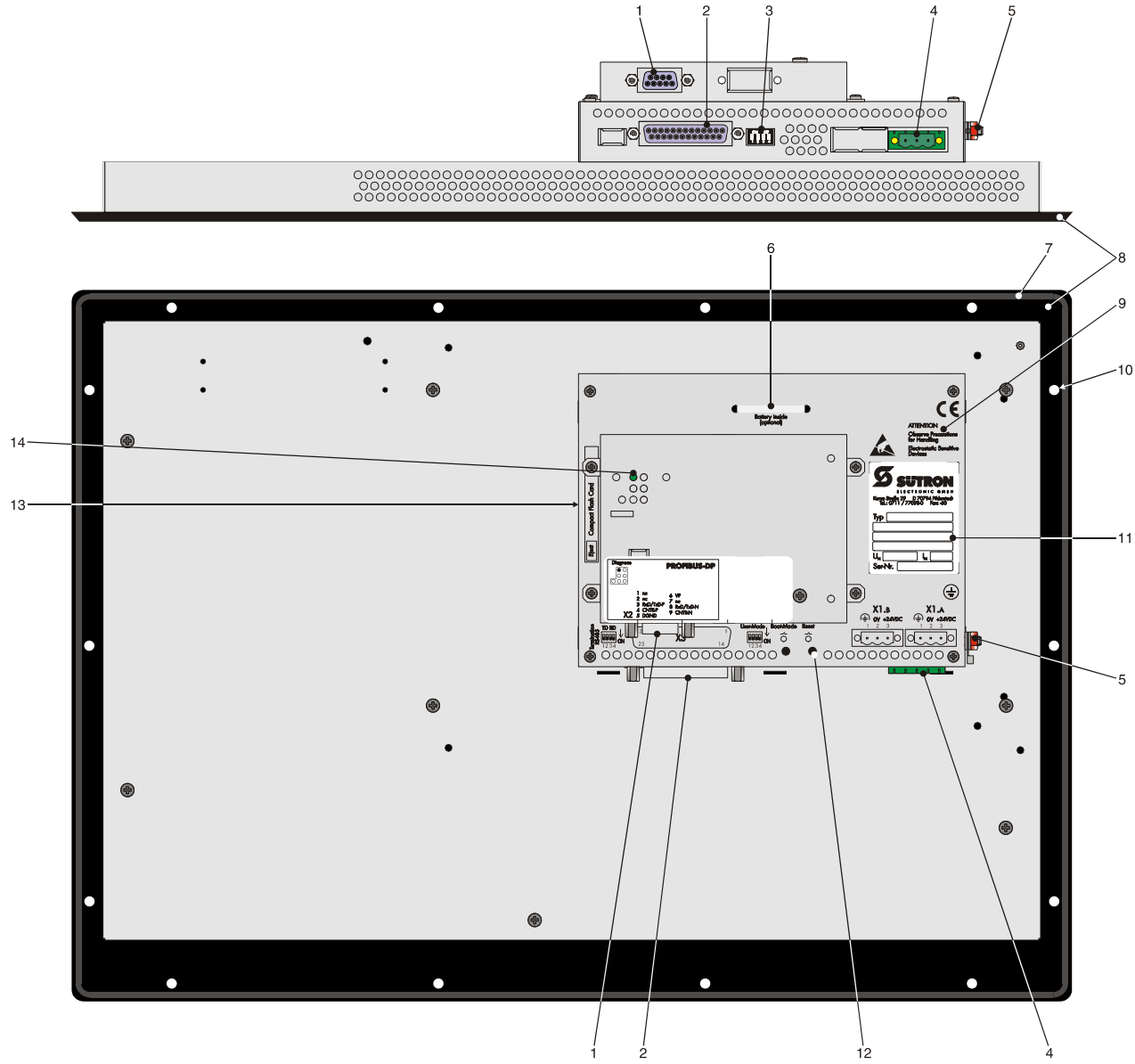



Figure 4-21 Rear view PROFIBUS-DP

1. Female Connector X2 (PROFIBUS-DP)
2. Female Connector X3 (SER2 RS232c)
3. User Mode Switch
4. Connector X1.A (Supply Voltage)
5. Threaded Bolt for Protective Grounding
6. Cable Fastener for Battery
7. Seal
8. Front Panel
9. Warning
10. Mounting Holes
11. Nameplate
12. Reset Key
13. CompactFlash Slot on the Side
14. Diagnostics LED

#### 4.2.6.1 Pin Assignment

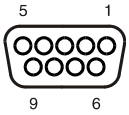



Figure 4-22 9 pin D-SUB female connector strip

Connector in the operating device: 9 pin D-SUB female connector.

Table 4-25 Pin assignment PROFIBUS-DP

| Pin | Designation | Function |
|---|---|---|
| 1 | nc | Not Connected |
| 2 | nc | Not Connected |
| 3 | RxD/TxD-P | Received Data / Transmitted Data Plus |
| 4 | CNTR-P | Repeater Control Signal Plus |
| 5 | DGND | Data Transmission Potential |
| 6 | VP | Supply Voltage of Terminators Plus |
| 7 | nc | Not Connected |
| 8 | RxD/TxD-N | Received Data / Transmitted Data Minus |
| 9 | CNTR-N | Repeater Control Signal Minus |

The D-SUB connector strips must be shielded sufficiently.
See chapter “Shielding D-SUB Connectors“ on page 4-27.

#### 4.2.6.2 Cable

Any PROFIBUS-DP-approved cables specified in the EN 50170 as cable type A can be used.

Table 4-26 Cable characteristics PROFIBUS

| Parameters | Value |
|---|---|
| Impedance | 136 to 165 Ohm |
| Capacitance | < 30 pf/m |
| Loop Resistance | 110 Ohm/km |
| Wire Gauge | 0.64 mm |

The maximum cable length depends on the baud rate (DIN EN 19245 Part 3).

Table 4-27 Baud rate PROFIBUS-DP

| Baud Rate | Cable Length |
|---|---|
| 187.5 kBit/s | 1000 m |
| 500 kBit/s | 400 m |
| 1500 kBit/s | 200 m |
| 3000 to 12000 kBit/s | 100 m |

#### 4.2.6.3 Diagnostics

A diagnostics LED is located on the rear of the operating device. The LED shows the states of the bus system.

The diagnostics LED on the operating device has the following functions:

Table 4-28 Function of the PROFIBUS-DP diagnostics LED

| Color | State | Function |
|---|---|---|
| Green | ON | Communication Active |

## 4.3 Memory Card

You can insert a CompactFlash card on the side of your operating device. The CompactFlash card allows you to exchange projects between the PC and the operating device.

You can recognize the rear side of a CompactFlash card by the notches on each side of the card.

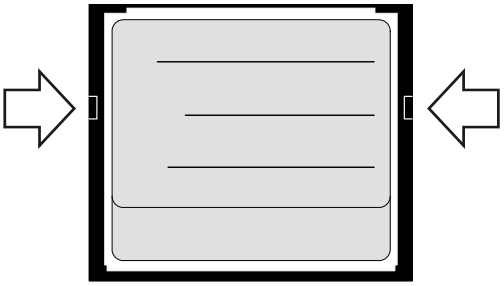


Figure 4-23 Rear view of the memory card

### 4.3.1 Inserting the Memory Card

When you insert the card from the rear side of the operating device, make sure the front side of the card is visible. Insert the card until it snaps into place.

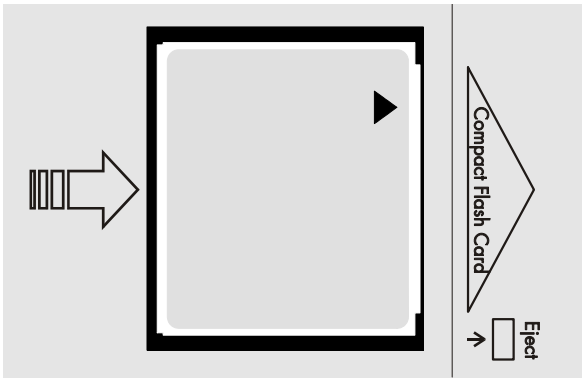



Figure 4-24 Inserting the memory card

### 4.3.2 Ejecting the Memory Card

To remove the card, press the ejection button on the operating device.

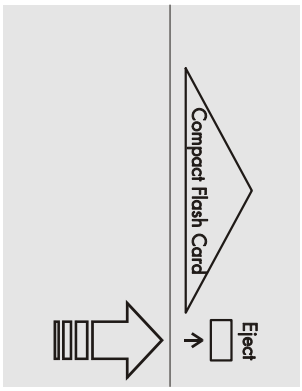



Figure 4-25 Ejecting the memory card

## 4.4 Shielding D-SUB Connectors

You must shield D-SUB connectors as follows:

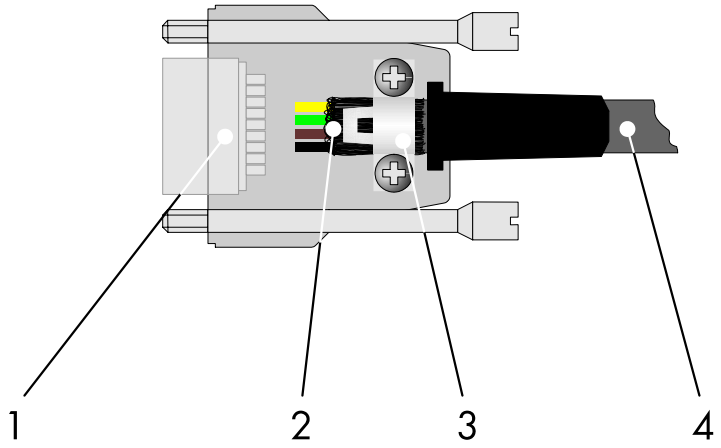



Figure 4-26 Shielding D-SUB connectors

**1** D-SUB connector
**2** Shield
**3** Cable clip
**4** Cable

The shield must be folded back into a flat position over the cable sheath.

When fastening the cable with the cable clip, as much of the shielding as possible must be in contact with the housing and sufficient strain relieve must be ensured.

# 5 Maintenance and Servicing

## 5.1 Maintenance Interval

The following maintenance intervals are recommended for this operating device:

Table 5-1

| Maintenance work | Interval |
|---|---|
| Changing the Battery | 4 Years |

## 5.2 Front Panel

Only use a damp cloth to remove any dirt from the front panel.

## 5.3 Fuse

The semiconductor fuse cannot be replaced!

A semiconductor fuse is used to protect the device. Once the fuse has been tripped, the device must be disconnected from the supply voltage to allow the semiconductor fuse to regenerate. At an ambient temperature of 20 °C (68 °F), the regeneration takes approximately 20 seconds. The higher the ambient temperature, the longer the regeneration takes.

## 5.4 Battery

The built-in battery preserves the data in the CMOS-RAM and supplies the real-time clock. The minimum battery life is 5 years, even under unfavorable operating conditions. When the battery runs down, the message „Change battery“ is generated automatically.

We recommend you change the battery approximately every 4 years as part of the regular maintenance work. A prepared battery including connector can be obtained directly from Sütron electronic.

If the „Change battery“ message is detected too late, e.g. the real-time clock stopped or shows the wrong date, data in the CMOS-RAM may have already been lost. For this reason, after changing a battery, always check data such as passwords that can be modified, parameters in the system variables, recipe data sets and entries in the message system.

### 5.4.1 Changing the Battery

Batteries must only be changed by authorized and trained experts!

For changing the battery you may only use replacement batteries of Sütron electronic.

Electrostatic discharge can damage electronic components! **Observe the ESD protective measures!**

Do not throw lithium batteries into fire, do not heat to 100 °C or higher and do not recharge. **Danger - Explosive!**

Do not open lithium batteries. **Danger - Toxic!**

To ensure that the data in the CMOS-RAM and the time are preserved, it is possible to change the battery under operating voltage. Observe the safety notes!

1. Disconnect the connector strip of the supply voltage.
2. Remove the threaded bolts of the interfaces (see figure).
3. Remove the screws (see figure) on the rear panel of the device and lift off the enclosure.
4. Remove the cable fastener securing the battery.
5. Plug in the connector strip of the supply voltage.
6. Disconnect the connector from the battery and remove the dead battery.
7. Plug in the connector of the new battery.
8. Disconnect the connector strip of the supply voltage.
9. Use a cable fastener to attach the new battery to the enclosure.
10. Place the rear panel back onto the device.
11. Carefully tighten the screws of the rear panel and then the threaded bolts of the interfaces.
12. Plug in the connector strip of the supply voltage.

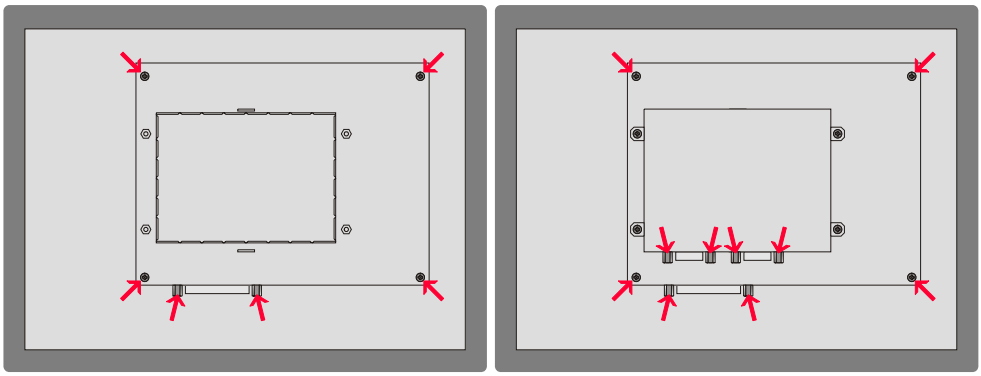


Figure 5-1 Screws at the standard device (left) / field bus device (right)

### 5.4.2 Battery Disposal

To prevent short circuitry in the collection boxes, insulate the poles of each battery with insulation tape or put each single battery into a plastic bag.

You must always return old batteries to a dealer or to a returns depot set up for this purpose by the public waste disposal body or a licensed battery dealer for recycling. Only dispose of dead batteries in public or commercial collection boxes. The battery is drained when the message „Change battery“ appears on the display of the device.

# 6 Technical Data

| Keyboard | Membrane Keyboard | Short-Stroke Keyboard with Tactile Feedback |
|---|---|---|
| Number of Keys | 20 | 46 |
| Actuator Travel | 0.6 mm (0.023") | 0.5 mm (0.020") |
| Actuating Force | 3 N | 2 to 3 N |
| Switching Cycles | Approx. 3 millions under the following conditions:<br>Pressing Element: Test Plunger (DIN 42115)<br>Pressing Force: 10 N<br>Pressing Frequency: 1 Hz | Approx. 1 Million |

| Display | BT35EM | BT35ET |
|---|---|---|
| Type | Monochrome | TFT |
| Resolution | 640 x 480 Pixels | 640 x 480 Pixels |
| Colors | 16 Gray Shades | 256 |
| Reading Angle | 90° | 90° |
| Default Contrast / Default Brightness Setting | By User Mode Switch | By User Mode Switch |
| LCD Lifetime | 100.000 h | 100.000 h |
| Half-Life Backlighting | 15.000h | 40.000h |
| Lines | 40 | 40 |
| Characters/Line | 80 | 80 |
| Display Area (H x W) | 162 mm x 215 mm (6.378" x 8.465") | 162 mm x 215 mm (6.378" x 8.465") |

| Electrical Data | |
|---|---|
| Supply Voltage | 24 V DC (SELV according to DIN EN 61131) |
| Residual Ripple | 10% Maximum |
| Minimum Voltage | 19.2 V |
| Maximum Voltage | 30.2 V |
| Current Consumption (Field Bus Device) | BT35EM: 0.4 A<br>BT35ET: 0.7 A |
| Connected Load | BT35EM: 10 W<br>BT35ET: 17 W |
| Fuse | Semiconductor Fuse, Self-Resetting |
| Protection Against Polarity Reversal | Built-in |

| Standard Interfaces | |
|---|---|
| Variable Baud Rates and Data Formats | |
| X3 SER1 TTY / 20 mA | According to CL 2 and DIN 66 348 T1<br>Transmission Length: 0 - 1000 m (3280.84 ft.), Twisted Pair, Shielded<br>Electrically Isolated |
| X3 SER1 RS485 | According to DIN 66259-4<br>Transmission Length: 0 - 1200 m (3937.01 ft.), Twisted Pair, Shielded<br>Electrically Isolated |
| X3 SER1 RS232c / X3 SER2 RS232c | According to DIN 66259 T1, CCITT V.28<br>Transmission Length: 0 - 15 m (49.21 ft.), Layer-stranded, Shielded<br>X3 SER1: Electrically Isolated<br>X3 SER2: Not Electrically Isolated |

| Field Bus Interfaces | |
|---|---|
| Variable Baud Rates and Data Formats | |
| X2.1 / X2.2 CAN Bus | According to ISO 11898<br>Electrically Isolated |
| X2.1 / X2.2 DeviceNet | According to ISO 11898<br>Electrically Isolated |
| X2.1 / X2.2 INTERBUS | Electrically Isolated |
| DO1 / DI1 / DO2 / DI2 INTERBUS OPC Optical Fiber | Electrically Isolated |
| X2 MPI | Electrically Isolated |
| X2 PROFIBUS-DP | Electrically Isolated |

| Central Unit | |
|---|---|
| Central Unit | 32-bit RISC CPU |
| Clock Frequency | 74 MHz |
| Other Characteristics | Watchdog Timer, Real-Time Clock, Temperature Compensation of the Display, Battery Monitoring |

| Memory | |
|---|---|
| Application Memory | 7 MByte Flash |
| RAM | 512 Kbyte Static CMOS-RAM, Battery-Backed |
| Memory Card | CompactFlash Card |

| Connection System |
|---|
| D-SUB Female and Male Connector Strips, 9 Pin and 25 Pin |
| Female and Male Connector Strips, Phoenix COMBICON, 3 Pin |
| Connection FSMA Type 905 |

| Environmental Conditions | |
|---|---|
| Operation | 0 °C to 50 °C (32 °F to 122 °F) |
| Storage, Transportation | BT35EM: - 25 °C to + 60 °C (-13°F to 140 °F)<br>BT35ET: - 25 °C to + 70 °C (-13°F to + 158°F) |
| Relative Humidity for Operation and Storage | 10% to 95%, No Condensation |
| Application Area | Degree of Pollution 1, Overvoltage Category II |

| Standards and Guidelines | |
|---|---|
| Interference Immunity | EN 61000-4-2<br>EN 61000-4-3<br>EN 61000-4-4<br>EN 61000-4-5<br>EN 61000-4-6<br>EN 61000-6-2 |
| Emitted Interference | EN 50081-1<br>EN 55022 Limit Value Class A |
| Equipment Requirements | EN 61131 |
| Storage and Transportation | EN 61131 Part 2 |
| Power Supply | EN 61131 Part 2 |
| Electromagnetic Compatibility | 89/336/EEC (Including all Applicable Amendments) |
| Degrees of Protection | EN 60529 |
| Impact Load, Shocks | EN 60068 Part 2-27 |
| Sinusoidal Vibrations | EN 60068 Part 2-6 |
| Corrosion Protection | IEC 60068 |

This is a class A device. This device may cause radio interference in residential areas. In this case, the user may be required to introduce appropriate countermeasures, and to bear the cost of same.

| Housing and Front Panel | |
|---|---|
| Housing | Steel Sheet, Galvanized |
| Front Panel | Aluminium, Anodized<br>320 mm x 450 mm x 4 mm (H x W x D) (12.598" x 17.716" x 0.157") |
| Front Panel Cover | Polyester Foil |
| Seal | Circumferential Rubber Seal on the Rear |
| Mounting Cutout | 296 mm x 426 mm (11.654" x 16.772") - (H x W) |
| Mounting Depth | Standard Device: Approx. 51 mm (2.008") - (Without Connector)<br>Field bus Device: Approx. 67 mm (2.638") - (Without Connector)<br>Field bus Device INTERBUS OPC LWL: Approx. 87 mm (3.425") |
| Degrees of Protection | Front: IP65<br>Rear: IP20 |
| Total Weight | Approx. 2750 g |

# 7 Ordering Data

Table 7-1 Accessories

| Description | Article No. |
|---|---|
| CompactFlash Card 16 MB | 81152.000 |
| CompactFlash Card 32 MB | 81152.032 |
| CompactFlash Adapter for Laptop | 81166.000 |
| CompactFlash Adapter for PC | 81167.000 |
| 25 Pin Download Cable | 88175.030 |
| USB-RS232 Converter for Download (Only in Combination with 88175.030) | 81215.000 |
| Battery, Prepared with Cable, Connector and Cable Fastener (Type CR2450) | 66757.000 |

# A Index

## R



## S



## T



## U

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